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THE

CHINA SEA DIRECTORY,

VOL. I.

CONTAINING

DIRECTIONS FOR THE APPROACHES TO THE CHINA SEA, BY MALACCA, SINGAPORE, SUNDA, BANKA, GASPAR, CARIMATA, RHIO, VARELLA, AND DURIAN STRAITS.

COMPILED IN THE HYDROGRAPHIC DEPARTMENT, ADMIRALTY.

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GLOSSARY OF A FEW MALAY WORDS OF FREQUENT OCCURRENCE IN MAPS, CHARTS, AND SAILING DIRECTIONS.

Malay.	*English.*
Amas	Gold.
Anak, anak ayer	Child, rivulet.
Ang-in	Wind.
——— darat	Land wind.
——— laut	Sea breeze.
Api	Fire.
Arang	Charcoal, coal (?)
Ayer	Water, river.
—— batu	Ice, hail.
—— dang kal	Shallow water, ford.
—— masin	Salt water.
—— sung-ei	Rain water.
—— tawar	Fresh water.
Banchah	Marsh, morass.
Barat, barat tapat	West.
——— daya	South-west.
——— laut	North-west.
Batang	River.
Batu	Rock, stone.
—— barani	Loadstone.
—— Bedil	Gun, musket.
Belantara	Forest, desert.
Bender	Port for trade.
Bengkok, bungkok	Crooked, humped.
Besar	Large, great.
Besi	Iron.
Beting	Sand-bank.
Biduk	Boat, Great bear.
Bintang	Star.
——— kutab	Pole-star.
Bras, nasi, imei	Rice, boiled rice.
Buah	Fruit.
Buaya	Alligator, crocodile.
Bukit	Hill.
Bulan, bulan bharu	Moon, new moon.
——— purmana	Full moon.
Buluh	Bamboo.
Burong	Bird.
Damie	Peace.
Danau, tasek	Lake, small lake.
Dapur	Cooking place.
Datu, datuk	Chief of a tribe.
Da-un, dahan	Leaf, bough.
Dayong	Oar, paddle, to row.
Etam	Black.
Gading	Ivory.
Gadong, godong*	House.
Gajah, gajah mina	Elephant, whale.
Gosong	Shoal, sand-bank.
Gunong	Mountain.
——— api	Volcano.
Jambatan, palambam	Bridge.
Jurang, churang	Creek.
Kalang-an	Dry dock.
Kampong†	Enclosure, village.
Kamudi	Rudder, helm.
Kapal	Ship.
Karang	Coral reef.
Karra	Monkey, ape.
Karsik	Gravel, sand.
Kayu, kayu api	Wood, firewood.
Kilat	Lightning.
Korong	Cabin, poop.
Kota	Fort, castle, tower.
Kuda	Horse.
Kuku	Fluke of an anchor.
Kuning	Yellow.
Kwala‡	Mouth of river.
Labuh-an	Anchorage, harbour.
Lama	Former, old, ancient.
Lampong	Buoy.
Lang-it	Sky, heavens, roof.
Lang-kong	Arch, crescent.
Lapong	Gap, wide.
Laut, laut besar	Sea, the ocean.
—— salatan	Southern ocean.
Layen	Sail.
Lembah	Valley.
Lichah, Lumpun	Mud.
Lima, lima-blas	Five, fifteen.

* Godong, corrupted to Godown. † Kampong, corrupted to Compound.
‡ Kwala, written Qualloe.

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Malay.	*English.*
Lubok	Bight or recess.
Mata	Points of the Compass
Merah	Red.
Nangka	Jack fruit (*artocarpus integrifolia*).
Negri	City, town, country.
Onjong	Point.
Padang	Plain, open space.
Padi	Rice in the husk.
Padoman	Mariner's compass.
Pahak, lembah	Valley.
Pakau, pasar	Market place, bazaar.
Palamban	Bridge.
Panjang	Long, tall.
Panchuran, trusan	Channel, passage.
Pasang	Tide.
——— besar	Spring tide.
——— kadang	High water.
——— kring	Low water.
Paya, rawah	Marsh.
Pendek, korang	Short, wanting.
Pikul	Weight of 133 lbs.
Pinang	Betel nut.
Pisang	Plaintain, banana.
Ponchak, kamanchak.	Peak of a hill.
Prigi	Well.
Pulau, Pulo	Island.
Putih	White.
Rachun	Poison.
Rakil	Raft.
Rantau	Plain, flat sea coast.
Rata	Flat, level, low.
Rawang, rawah	Swamp, marsh.
Rumah chukei	Custom-house.
Rumpak	Pirate.
Sakat	Bar, barrier.
Salat, sellat	Strait of the sea.
Salatan	South.
——— daya	South-south-west.
Sampan	Canoe, small boat.
Sapah, sippah	Quid of betel.
Sudagan (Ar.)	Merchant, trader.
Sung-ei	River.
Tambaga	Copper.
Tambang	Mine.
Tanah, benua	Land, country, earth.
Tanda	Beacon.
Tanjong, tapat	Cape, point, cliff.
Tasek	Inland sea, lake.
Teluk	Bay.
Timor	East.
——— laut	North-east.
——— tung-ara	South-east.
Ubat bedel	Gunpowder.
Ujong tanah	Promontory.
Utara	North.
Utan, rimba	Forest.
——— timor	North-east.
——— sa-mata timor.	North-north-east.
——— barat-laut	North-north-west.

The vowels are to be sounded as in Spanish and Italian, or as in the following English words:—*a* and *i* as in ravine, *e* as in there, *o* as in go, *u* as in rule, *ai* and *ei* as in height, *g* hard as in get, *ng* as in singer not as in finger.

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ADVERTISEMENT TO SECOND EDITION.

THE China Sea Directory, Vol. 1, contains Sailing Directions for the approaches to the China sea by Malacca, Singapore, Sunda, Banka, Gaspar, Carimata, Rhio, Varella, and Durian straits; also general observations on the passages from the Cape of Good Hope to Sunda strait, and to ports in the China sea.

The material used in the compilation of this work has been gathered from the surveys of Commander Fell, Lieutenants Jackson, Rose, Moresby, and Ward, Indian Navy, for Malacca strait; of Captains Ross, Maughan, and Lieutenant Robinson, Indian Navy, for Gaspar and Carimata strait; of Messrs. Richards, Stanton, and Reed, Masters, R.N., and Mr. Thomson, Government Surveyor, for Singapore, Banka, and Rhio straits; and of Lieutenants Collinson and Moresby, Indian Navy, for Durian strait.

Sunda strait to Banka strait is from various authorities. Commander Bullock and Mr. Wilds, in H.M. surveying vessels *Serpent* and *Swallow*, 1865-6, searched in vain for many reported dangers in this route, and rectified the positions of others; yet as no complete survey has been made vessels should navigate it with caution. Gaspar strait, surveyed by Lieutenants Rodgers, Collins, and Stevens, United States Navy, 1854, has been the chief authority adopted for that part. Carimata strait has received additions, 1874–6, from partial examinations made in H.M. surveying vessels *Sylvia* and *Nassau*, Captains St. John and Napier, but the mariner must nevertheless navigate this strait with caution.

The most recent surveys made by the Netherlands Government have been consulted, as have also Horsburgh's Directory, Vols. I. and II., and the Remark books of H.M. ships.

This volume was originally compiled by Staff Commanders J. W. Reed and J. W. King. The present edition has been added to and corrected by Staff Commanders J. C. Richards and Hitchfield, Royal Navy.

As this volume embraces a large extent of coast, and many islands and dangers which are but imperfectly explored, it must be considered incomplete, and occasions for revision and amendment will doubtless occur.

F. J. E.

Hydrographic Office, Admiralty, London,
February, 1878.

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IN THIS WORK THE BEARINGS, INCLUDING THE DIRECTION OF WINDS AND CURRENTS, ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

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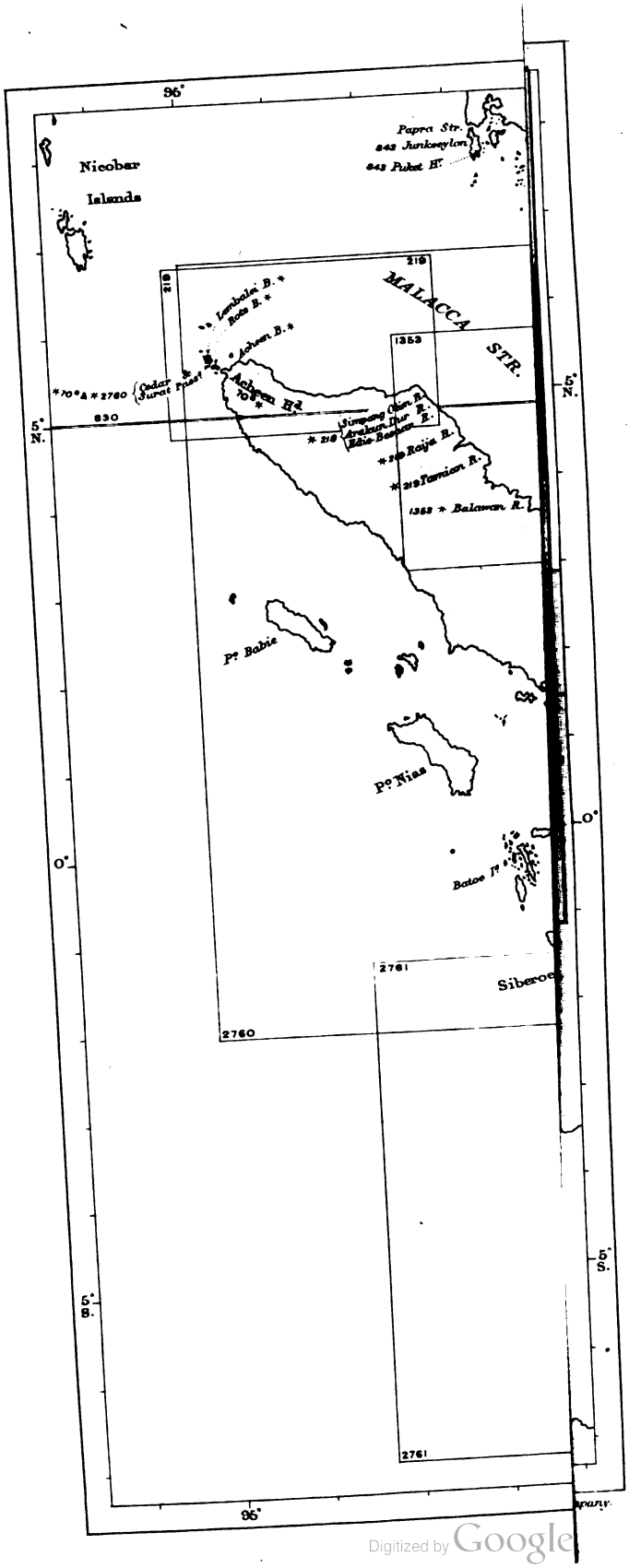

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THE

CHINA SEA DIRECTORY.

VOL. I.

CHAPTER I.

MALACCA STRAIT.

VARIATION 1° 45′ East in 1878.

GENERAL REMARKS.—Malacca strait may be considered as limited on the north-west by a line joining Acheen head and Salanga or Junkseylon island, and on the south-east by a line joining Carimon islands and Tanjong Bolus, at the western entrance of Singapore strait. Within these limits Malacca strait is 550 miles long, in a general south-easterly direction; it is 210 miles broad at the western entrance, 160 miles broad at Diamond point where the strait first narrows, and 8 miles broad at the eastern entrance.*

The western or Sumatra side of the strait is an alluvial plain, generally only a few feet above the level of the sea, and varying in extent from 60 to 100 miles from the mountain ranges of Sumatra: the low coast line is unbroken by any large bays, but forms near the narrowest part of the strait a range of low islands. The coast is intersected by numerous rivers, some of which are of considerable magnitude, and subject to the bore or tidal wave; the neighbourhood of these rivers appears to afford almost the only clear space for cultivation.

The population of Sumatra, consisting chiefly of Malays, is divided into several nations or states, some of which have made considerable progress in civilization; others, chiefly those living in the mountainous regions of the island, are but little removed from the savage state. Of these

* *See* Admiralty charts: Indian Ocean, northern part, No. 748*b*; Bengal bay, sheet 2, No. 70*b*; Bengal bay, Bassein river to Pulo Penang including Andaman and Nicobar islands and north coast of Sumatra, No. 830; Sumatra, west coast, sheet 1, No. 2,760; Malacca strait, sheet 1, Diamond point to North Sands, No. 1,353; Malacca strait, sheet 2, North Sands to Singapore, No. 1,355; North coast of Sumatra, Acheen head to Diamond point, No. 219; Malay coast, Pulo Penang to Parcelar hill, Nos. 793*a* and 793*b*; North and South sands, Nos. 794*a* and 794*b*; Cape Rachada to Mount Formosa, Nos. 795*a* and 795*b*; Mount Formosa to Tanjong Bolus, No. 796.

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nations, the north end of the island belongs to the kingdom of Acheen, the Batak nation next to the south-eastward; then the Siak state, which is traversed by the finest river in Sumatra, bordering the narrowest part of the strait.

The eastern or Malayan side of the strait is for the most part low and wooded near the coast. A mountain chain traverses the Malay peninsula, and here and there isolated mountains are found within a few miles of the coast. The mountain chain diminishes in height as it approaches the equator—many of the peaks north of Queda (lat. 6° N.) rise to an elevation of 6,000 feet, while few in the southern part of the peninsula rise above 3,000 feet. Between the mountains and the coast the surface is undulating, covered with dense primeval forests, or interspersed with grassy plains, which are more numerous and extensive in the north.

Many rivers empty themselves upon the Malay coast, and in their progress form marshes and lakes, some of which are of considerable size. The banks of the rivers are generally low and swampy, and covered with mangrove and other thickets. Several of the rivers are broad and moderately deep, but all are barred by banks or reefs, which, as a general rule, prevent a vessel drawing more than 8 or 9 feet entering. In the northern part numerous verdant islets stud the coast.

British Settlements.—Part of the Malay coast is occupied by British settlements, namely, Province Wellesley, a strip of coast 8 miles broad and 35 miles long, adjacent to Pulo Penang (also a British settlement): Pulo Pancore or Dinding island and the adjacent coast—commencing at Pulo Katta, this strip is 22 miles long in a northerly direction, and 8 miles broad—and the settlement of Malacca, about 40 miles in length and 25 miles in breadth, included on the sea coast between the rivers Lingey and Moar. The intervening territories are occupied by various Malay states, the population of which are much addicted to piracy.

The navigable channel of Malacca strait is of considerable width at the north-western part. Abreast Penang it is 120 miles wide, and gradually decreases in width until Arroa islands and North Sands are approached. Here commence a series of long and narrow shoal banks, which extend nearly through the centre of the strait in a north-west and south-east direction, and with little intermission to the south-eastern end of the strait; they narrow the available channel in some parts to 8 or 10 miles. Both shores of the strait are fringed with shallow mud-banks, which on the Sumatra side extend seaward in some places a distance of 18 miles, but from the Malayan side much less; these banks, together with those in the offing, are, as a general rule, steep-to. There are also several detached groups of islands.

Soundings.—The soundings in the north-western part of Malacca

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strait outside the fringing banks vary from 25 to 50 fathoms; in the south-eastern part from 10 to 30 fathoms. Some of the central banks are nearly dry, and should be approached with caution.

WINDS and WEATHER.—Although Malacca strait is within the limits of the north-east and south-west monsoons of the Indian ocean, yet on account of the high land on either side of the strait the winds are variable; but land and sea breezes are regular on both coasts. In the offing the monsoons are only regular when they are at their height in the adjacent seas; even then, however, the wind is moderate in the channel and only lasts during a part of the day. The monsoons become more regular near Singapore.

South-west Monsoon.—Near Acheen head the south-west monsoon commences in the latter part of April or early part of May, and ceases in October; but in November westerly winds frequently prevail; during this season the weather is generally cloudy and stormy accompanied with rain, especially in July and August, when the monsoon is at its highest.

The south-west monsoon seldom blows far into the strait. In the middle of the strait during this season variable winds, chiefly those from S.E. and S.W, prevail with long calms. On the Sumatra side light winds and calms prevail, and heavy squalls from the land are experienced during the night. On the Malayan side there are fewer calms and seldom any squalls; variable winds or land and sea breezes are experienced.

Sumatras, or squalls from the south-west, are more common during the south-west monsoon than in the north-east monsoon. They generally blow during the first part of the night, are sometimes sudden and severe, and are accompanied by thunder, lightning, and rain; they are more frequently met with on the Pedir coast (Sumatra), and on the Malay coast between Parcelar hill and Carimon islands. Here they often blow for six or eight hours at a time as a strong or moderate gale.

North-westers are not so frequently felt as the Sumatras; they are most common during the south-west monsoon and in the north-western part of the strait between Acheen head and Arroa islands, but sometimes blow through as far as Singapore strait. These winds are sometimes severe at their commencement, but their strength soon abates. They are generally preceded by a black cloud arch, which rises rapidly from the horizon towards the zenith, often allowing not more than sufficient time to reduce sail after its first appearance. They are sometimes accompanied by lightning, thunder, and heavy rain.

The North-east Monsoon prevails in the western entrance of Malacca strait from November to April, which is the fair season, the weather being then more settled; there are seldom any hard squalls, and there is less thunder, lightning, and rain than in the other season.

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In November the winds are variable, frequently from N.W. and West although occasionally the N.E. winds set in regularly in November. From this period to March the north-east monsoon is strongest, but at times N.W. and West winds of one or two days duration have been experienced in every month when the north-east monsoon should prevail. Late in March the N.E. and northerly winds become light and variable, with strong land breezes at night. On the Malayan side these breezes commence between 8 and 10 p.m., and last four or five hours, sometimes all night; this is more generally the case between mount Formosa and cape Rachada. There is less calm on the Malayan side than on the Sumatra side of the strait.

CURRENTS and TIDES.—Between the western entrance of Malacca strait and Arroa islands the general set of the current is to the north-west all the year round, but near the Malay coast regular tides mostly prevail, except occasionally during the north-east monsoon, when the current sets to the S.E. along the Malay coast. During the south-west monsoon the current runs to the westward along the coast of Pedir, whilst it is setting to the northward between Pulo Rondo and Salanga island. Between Diamond point and the eastern entrance of the strait a tidal influence prevails near the coast.

In the entrance of Malacca strait, between Acheen head and Nicobar islands, the current generally runs with the wind. This, however, is not always the case, for at times the current is found to run obliquely and even contrary to the wind.

From Arroa islands to Carimon islands regular tides prevail throughout the strait; the flood sets to the S.E.; the ebb sets to the N.W., and runs longer and is stronger than the flood; the streams run from 2 to 3½ miles an hour. Near Arroa islands the flood is often weak, and during neaps there is a constant current setting to the north-west.

The flood setting to the south-east past Carimon islands meets between the north end of Little Carimon island and Tree island, the flood setting from China sea through Singapore strait; after this junction the flood sets to the southward through Durian strait.

In most parts of Malacca strait the streams run 2 to 3 hours after high and low water by the shore. The greatest rise and fall is 15 feet.*

GENERAL DIRECTIONS.—The navigation of Malacca strait is, with ordinary caution, not dangerous, the channels are mostly spacious and have good anchorage, but due attention to the set of the currents

* It appears that there (Malacca strait), as on the coasts of Scinde, Guzarat, Concan, and other parts northward of the Equator, the principal or highest tides are in the day during the south-west monsoon, when the sun is near the northern tropic; and the highest tides at these places happen in the night during the north-east monsoon, when the sun is in the southern hemisphere.—*Horsburgh's Directory*, vol. 2, 8th edition, p. 110.

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and tides is requisite. The passage is much facilitated by keeping under way at night, for steady breezes then often prevail, calms and faint airs being experienced during the day; passages are thus made without anchoring more than once or twice. The passage to the north-west is generally made in a shorter time than the one to the south-east. Vessels which sail well will, by taking every advantage of the favourable shifts of wind, gain ground during neap tides against the tide or current, with a moderate working wind in most parts of the strait; to this exception must be made in the narrow part of the strait, where the tides run strongest. A stream anchor ready for tidal use will be found convenient in most parts of the strait.

Approaching from the Westward during S.W. Monsoon.—A sailing vessel from Ceylon during the south-west monsoon should steer so as to pass between Pulo Rondo and the south end of Great Nicobar island, carefully taking every opportunity of verifying the ship's position, as the currents during this season are strong and uncertain. Vessels set to the southward, which is not an uncommon occurrence when there is much westing in the monsoon, may pass between Acheen islands, by one of the passages to be hereafter mentioned, but with a steady and commanding breeze Bengal passage is the best.

A vessel bound to Acheen should in this season keep well to the southward to make Acheen head, then with great care she may proceed through Surat passage or through Cedar passage (see page 11). At a considerable distance Acheen head appears like a steep hill, Pulo Gomez then resembles two paps, the western point of the island being very low.

When to the eastward of Pulo Way the monsoon will most likely fail, but vessels should endeavour, by the aid of the variable winds, to sight Pulo Buton and then keep on the Malayan side of the channel, where, as already stated, a tidal influence prevails, and where there is less calm, but generally variable winds, or land and sea breezes. Sometimes a brisk westerly wind will be carried as far as Penang. When once the islands on the Malay coast are sighted there will be no difficulty in getting to the south-east.*

In the entrance of Malacca strait near Nicobar islands and Acheen islands, and between them and Salanga (Junkseylon), there are often

* Some navigators prefer the track from Pulo Rondo along the coast of Sumatra to Diamond point, and thence to Pulo Varela and Arroa islands. Speedy passages have sometimes been made both early and late in the season, by keeping near the Pedir coast to benefit by the land and sea breezes which prevail only near the shore. Light airs and calms prevail in the offing, and as the current is generally setting to the westward along the coast during the south-west monsoon, it is necessary to keep within the anchoring ground in many places within one or 2 miles of the shore. This track is now seldom pursued, as, in addition to the baffling winds and westerly currents, it is subject to dangerous lightning, and sudden and severe squalls from the land during the night.—*Horsburgh's Directory*, vol. 2, 8th edition.

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strong and noisy ripplings, particularly in the south-west monsoon. These ripplings occur when there is no perceptible current, and in calm weather are seen approaching from a considerable distance; in the night their noise gives warning of their approach; their spray sometimes breaks on a vessel's deck.

After passing to the westward of Pulo Buton, at any convenient distance, 10 to 20 miles, and not being bound to Penang, a course should be steered to pass nearly midway between Sambilang islands and Pulo Jarra. With a working wind the west side of Penang may be approached to soundings of 10 or 12 fathoms; Great Kra flat and the bank which skirts the coast to Pulo Dinding, and extends seaward 10 or 12 miles, may be approached to the same depths, guarding against the indraft of the rivers on the flood tide when near the bank. Under 15 fathoms the water shoals rapidly to the edge of the bank. Sambilang islands and Pulo Jarra have deep water within a short distance, and may be seen from a distance of 20 miles. In this track, so far, soundings of 28 to 34 fathoms will have been found.

After passing Sambilang islands the vessel should make for the North sands and steer a course to pass 5 or 6 miles to the westward of the north extreme; the soundings will then decrease from 28 or 30 fathoms to 10 or 15 fathoms. In this depth during daylight Arroa islands will probably be sighted. Round Arroa island, having trees on its summit, may be seen a distance of 15 miles from the deck, when, guided by the bearing of these islands and the soundings, the vessel may pass along the west side of the sands until One-fathom bank lighthouse be sighted. Steer a course to pass 2 miles westward of the lighthouse.

When the winds incline from the East or E.S.E., keep near the Malay coast in soundings of 20 or 30 fathoms, until 25 or 30 miles past Sambilang islands, then steer more southerly to get soundings of 16 or 18 fathoms on the north-west edge of North sands; keep in these soundings, rounding the edge to the south-west until Arroa islands and Parcelar hill are sighted; from the masthead both may be seen when on the north-west edge of North Sands.

Working.—With a foul wind it is advisable to keep near the western edge of North Sands, making short tacks to the westward and approaching the edge of North Sands to 10 or 11 fathoms. One-fathom bank light, which is visible 13 miles, should not be brought to bear southward of S.E. by S., until within a distance of 4 miles, when this bearing is no longer available as One-fathom bank, with its outlying shoal-head of $4\frac{1}{2}$ fathoms extends 4 miles to the north-west. By keeping near the edge of the sands more moderate depths will be found for anchoring, and more regular tides; to the westward a north-westerly current often prevails, especially during

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neaps. On the North Sands during springs the flood sets S.E. and the ebb N.W. at the rate of 3 to 3½ miles an hour, and run two or three hours after the times of high and low water. During neaps the tides are weak and irregular. Much caution is therefore requisite in navigating this part.

Vessels drawing less than 20 feet may work across the sands which lie between Blenheim shoal and One-fathom bank by keeping Parcelar hill between the bearings E.S.E. and E. ¾ S. The north-west end of One-fathom bank is marked by a red buoy.

The Track.—Having passed One-fathom bank the vessel should approach the coast in the vicinity of Parcelar hill to a distance of 6 or 7 miles, and to soundings of 17 to 20 fathoms. Parcelar hill lies at a distance of 4 miles from the coast; when abreast of the hill steer to pass 5 miles outside cape Rachada, which in the distance appears like an island. Cape Rachada light is visible 26 miles; it should not be brought to bear eastward of E. ½ S. in order to clear Pyramid shoal, nor southward of S.E. by E. ½ E. to clear Bambek shoal. From cape Rachada steer to pass 4 or 5 miles outside Water islands, and in soundings of 20 to 26 fathoms; this course will lead 7 miles north-eastward of Raleigh shoal, and about 10 miles north-eastward of Rob Roy bank. From Water islands steer to pass between Long and Fair channel banks and 5 miles outside Pulo Pisang; thence through Singapore strait, passing north of Tree island. *See* chapter 2.

Working.—In working to windward in the neighbourhood of Parcelar hill do not stand more than 10 miles off the land in order to give a good berth to South sands, which should be approached with care, as they are steep-to. To the westward of Parcelar hill the land may be approached to one or 2 miles, but a vessel should guard against the indraught of Callam strait. North-eastward of Bambek shoal the shore may also be approached to one or 2 miles. Cape Rachada light, as before remarked, kept between the bearings S.E. by E. ½ E. and E. ½ S. will lead clear of Bambek and Pyramid shoals.

It is not advisable for large vessels to exceed the distance of 10 or 12 miles from the Malay coast. In judging the distance from the coast the soundings are so irregular as to afford no guide.

After passing Water islands and Rob Roy bank there may be said to be no danger in the channel until mount Formosa is approached. Vessels may stand safely over towards the Sumatra shore and to a distance of 15 or 16 miles from the Malay coast; by keeping the lead going, sufficient warning is given of approach to the mud-flat skirting Malay coast. Pulo Bucalisse is low and woody, and may be approached at its north-eastern side to 4 or 5 miles, the lead being a sufficient guide when to tack.

Abreast Long bank the channel for large vessels is narrowed to 11 miles.

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If Pulo Pisang be seen, keep it between the bearings E. by S. and S.E. by E. ½ E. In standing towards the Malay coast, the soundings on Fair-channel bank are a good guide, and on a nearer appproach to Pulo Pisang vessels may, guided by the soundings on the ridges, stand farther over towards the Sumatra shore. From Pulo Pisang to Tanjong Bolus the channel is comparatively clear, and guided by the soundings vessels may safely approach either side, taking care to avoid the spit which extends 5 miles to the south-east of Pulo Pisang, and which is steep-to. The shore between Pulo Cocob and Tanjong Bolus should not be approached within 2½ miles; do not shoal less than 17 fathoms.

Tides.—Near cape Rachada, where the strait suddenly becomes narrowed to 20 miles, the tides run strong, and with eddies during springs. In the offing between Water islands and Carimon islands the tides set fair through the strait, except near Pulo Pisang, when the flood sometimes sets a vessel towards Carimon islands.

Approaching from the westward during the N.E. Monsoon.—Vessels from Ceylon are recommended to pass close to south end of Great Nicobar island if the wind permit. Those from Madras should pass through Sombrero channel (Nicobar islands). When within the strait they should endeavour to get near the Malay coast as soon as possible, where there are tidal streams and more favourable winds. A heavy swell rolls on the Sumatra coast during the north-east monsoon. The passage from Ceylon during this season is generally a tedious one, occupying 20 to 30 days.

From the eastward during the S.W. Monsoon.—Vessels bound through Malacca strait to Ceylon during the south-west monsoon should, with a favourable wind, keep a mid-channel course until Arroa islands are passed, they should then keep a good offing from the Sumatra shore in order to avail themselves of the prevailing north-westerly current and to be out of the tidal influence eastward of Diamond point. From Diamond point to Acheen head, the Pedir coast should be approached in order to benefit by the westerly current adjacent to it. Steer through Bengal passage, keeping close to the north-east side of Pulo Brasse. From a good berth off Acheen islands vessels must endeavour to cross the equator and pass into the region of the south-east trade wind, a westerly course should then be pursued until on the meridian of the intended port, then a north course may be followed, observing to fall in with the land on the west side of Point de Galle if bound there, for strong westerly winds and easterly currents prevail along the south coast of Ceylon during the south-west monsoon.*

Some vessels have made the passage to Madras from Acheen head in

* *Horsburgh's Directory*, vol. 2, 8th edition, p. 77.

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fourteen or fifteen days during the strength of the south-west monsoon, by taking advantage of every favourable change of wind to obtain westing and tacking as most convenient. The passage may sometimes be found impracticable by those which sail indifferently by the wind.

From the Eastward during the N.E. Monsoon.—Vessels bound through Malacca strait to Ceylon during the N.E. monsoon usually experience favourable weather and a fair wind. They may pass on either side of Pulo Pera and borrow towards Pulo Rondo or towards the south end of Great Nicobar island as convenient. If bound to Point de Galle the land should be made to the northward of Little Basses.

If bound to Madras, or other part of the Coromandel coast, vessels should keep the Malay coast and its adjacent islands until Salanga island is reached, which may be rounded at a convenient distance. Thence, if early in the season, a course should be steered to pass through Ten-degree channel, between Car-Nicobar and Little Andaman islands, or the Sombrero channel may be chosen at discretion if not bound to the northward of Madras. In December and January care must be taken to make the land a little to the northward of the intended port.

STEAM VESSELS.—The preceding remarks on passages apply chiefly to sailing vessels; steam vessels bound from Malacca strait to Aden during the south-west monsoon will find it their interest to gain the equator as early as possible, without too great sacrifice of westing; say on a S.W. course, which course should be continued until in latitude 1° S. Then steer W. by S. to cross the meridian of long. 80° E. on the parallel of 3° S. From this position steer West until the long. of 61° E. be reached; then steer to cross the equator in 58° E., and proceed for Ras Hafún, the east point of Africa. By keeping to the southward of the equator the strength of the current is lessened, and the vessel will pass through a large extent of calm. By recrossing the equator so far west the vessel will be in a favourable position to avail herself of both wind and current in entering the bad weather of the south-west monsoon.*

During the north-east monsoon steam vessels bound from Aden or Ceylon to Malacca strait will naturally take the most direct route.

Caution.—The utmost care is necessary in making the land in the vicinity of Rás Hafún and cape Guardafui, and verifying the vessel's position by soundings, especially during the south-west monsoon, when the weather is hazy.†

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* *See* Wind and Current charts for the Pacific, Atlantic, and Indian oceans, published by the Admiralty, 1872.

† Directions for approaching this part of the coast of Africa, will be found in Gulf of Aden Pilot, 1872, pages 18 and 47; and Africa Pilot for the south and east coasts, third edition, 1878.

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THE SUMATRA COAST.

PULO RONDO, or Tepoerong, is the northernmost of the islands lying off Acheen head, the north-west point of Sumatra; its summit is situated in lat. 6° 3½ N., long. 95° 8′ E. 30 miles N. by W. ½ W. from the nearest part of Acheen head. The island is 426 feet high, dark-coloured, round, 2 cables in diameter, and steep-to; there are no soundings near it, except on the south side, where also at the distance of a mile are two or three rocky islets 60 to 120 feet above water.

PULO BRASSE, north-west end, in lat. 5° 44½′ N., long. 95° 2′, 19 miles S. by W. ½ W. from Pulo Rondo, is the westernmost of the islands off Acheen head; it is 9½ miles long in a north-west and south-east direction, high and level. Off the north end are four rocky islets, the northern (N.W. islet) is 25 feet high and about 3½ miles distant, with soundings of 25 to 28 fathoms within a mile. The other islets lie within 1¼ miles of the shore; the sea breaks heavily on them even in moderate weather. There is a passage between the outer and the three inner islets, but vessels are recommended to pass outside.

Fleurs rock, a small rock having a probable depth of 6 feet, lies about 1½ miles from the west point of Pulo Brasse, and nearly in line with two small rocks above water off the north point of Pulo Brasse. The water in the vicinity of the rock is discoloured, and breaks when there is any wind.

The current sets strongly to the westward past the islets.

Soundings of 15 to 20 fathoms, sand, will be found within a mile of the north-east and south sides of Pulo Brasse, where vessels may occasionally anchor.

LIGHTS.—On the north point of Pulo Brasse stands a tower, 120 feet high, which is painted white to a height of 98 feet and red the remainder; from the tower is exhibited at an elevation of 525 feet above the level of the sea a *revolving* white light which attains its greatest brilliancy *every minute;* the light is visible between the bearings of E. ⅝ N. (through south and west) and N.W. ½ W., and in clear weather should be seen from a distance of 30 miles; within a distance of 12 miles a faint continuous light is seen.

From the same tower, at a height of 26 feet above the ground, and 430 feet above the sea, is exhibited a *fixed red* light visible between the bearings of S. by E. ½ E. and E. by N. ½ N. or through an arc of 90°, the centre of the arc passing over North-west islet; the light is intended to warn vessels of their approach to this islet and in clear weather should be visible from a distance of 8 miles.

Lembalei bay, on the north-east side of Pulo Brasse, is about 1½ miles broad, half a mile deep, and has 19 fathoms water in the entrance,

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thence shoaling gradually to the shore. There is anchorage in the north-west part in 9 fathoms, 3 cables distant from the village.*

PULO NANCY (or Nassie), nearly joins the south-east point of Pulo Brasse, being separated by a narrow rocky channel of irregular depth, and in which the tides run with great strength. Pulo Nancy is saddle-shaped, and about 4 miles long north and south. About a mile S.S.W. from the south-west point is a rock which breaks at half tide, and between the rock and the shore there are 10 to 12 fathoms, outside there is 16 fathoms. About 2½ miles to the eastward of this rock and about half-a-mile off shore is another rock of 3 feet depth, with 6 and 8 fathoms close-to. From the first-mentioned rock the south extreme of Middle island is in line with the northern of the small islets south of Middle island, bearing W.N.W. From the second, or 3-feet rock, the south extreme of the islet off the west end of Stony islet is in line with a red mark in the cliff near King point. The south-east point of Pulo Nancy is skirted by rocks.

There is anchorage in 6 or 7 fathoms in a bay on the south side of Pulo Nancy island, about a mile eastward of the west point. Fresh water and firewood may be procured on the west side of the bay.

Rots bay, on the north-east side of Pulo Nancy, is about 4 cables broad and 4 cables deep. Off the south point of the bay is Rots island, small and nearly circular. There is anchorage in Rots bay in 6 fathoms at 3 cables from the shore.*

Water.—Fresh water may be obtained on Pulo Brasse and Pulo Nancy, but on visiting these islands caution is necessary, as a boat belonging to the vessel which was under the command of Commander Fell, I.N., 1851, was three times fired at from the shore.

Middle island, or Pulo Nassie Ketjil, lies off the south side of Pulo Brasse, between the latter and Pulo Nancy; off the south side of Middle island, a mile distant, is a group of small islets, with 9 to 12 fathoms water between them and Pulo Nancy.

CEDAR or Sedre PASSAGE is formed between Pulo Nancy island on the north and Pulo Gomez (or Klappa) and Stony island on the south. The channel which lies to the southward of the rocks already mentioned off Pulo Nancy is about a mile wide at its narrowest part, and has from 15 to 20 fathoms water.

The western point of Pulo Gomez is low, and has an islet adjoining; breakers extend about half-a-mile to the westward of it. The south side of Pulo Gomez is safe to approach.

Cedar passage is little frequented, although much wider than Surat passage, more free from eddies, and safer for a vessel proceeding to the

* *See* plan on Admiralty chart, No. 219; scale, *m* = 3 inches.

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westward with a foul wind, as she can drift with the tide under sail, taking care to avoid the rocks (already mentioned) off Pulo Nancy island. Stony island may be approached to within a quarter of a cable on its north-west side.

A rocky patch of 4 fathoms is situated W. by S. 8 miles from the west end of Pulo Gomez island, and S. by W. ¼ W. 5½ miles from the west point of Middle island; this patch is near the northern extremity of a narrow ridge of soundings of 7 to 10 fathoms (and possibly less), which extends 40 miles in a S. by E. ½ E. direction.

ACHEEN HEAD is a high bluff promontory, forming the north-west extremity of Sumatra. At a considerable distance Acheen head appears like a steep hill, Pulo Gomez then resembles two paps, its western point being very low.

King point is the south-west extremity of the promontory of Acheen head and lies about 3 miles to the south-west of the head.

Tides.—It is high water, full and change, at 10h.; springs rise 5 feet, neaps 3½ feet.

SURAT PASSAGE (Sawang Haroes Ketjil) is formed by Pulo Gomez, Stony island, and Pulo Angkasa on the north-west and the promontory of Acheen on the south-east. Between Pulo Angkasa and Acheen head at the eastern end the passage is only 150 yards wide, but has from 12 to 14 fathoms water. Between Pulo Gomez and the mainland the passage is 1½ miles wide with 12 to 16 fathoms water. Near the east side of Pulo Gomez there is a rock a cable from the shore.

Directions.—In approaching Surat passage from the south-west no opening is perceived, the adjacent islands Gomez, Nancy, and Brasse appearing to join the mainland when seen from that direction. To the southward of King point, at the distance of 5 miles, and on the south side of a low green point there is a sandy bay, which at a considerable distance may be mistaken for Surat passage or a strait, the adjacent land being low near the sea, and covered with trees.

Steering for Surat passage, vessels should keep nearer to Acheen head than to the opposite side of the channel, as Acheen head is bold, with regular soundings of 12 to 14 fathoms, sand, at a moderate distance, and temporary anchorage may be found near the shore in 7 to 10 fathoms water. The south side of Pulo Gomez island is also safe to approach, but not so bold as the other shores, there being 18 fathoms within half a mile of its south point. If the tide be unfavourable the vessel should anchor near Acheen head until the flood stream makes; the flood sets directly through the passage to the north-east, the ebb in the opposite direction at the rate of 5 to 6 miles an hour at springs in the narrowest part of the passage; the eddies caused by the rapid tides render steering in

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this part very difficult for sailing vessels during light winds, and for large vessels is attended with some risk.

PULO WAY, the north-easternmost and largest of the islands off Acheen head, lies about 13 miles to the north-east of the head and 10 miles to the south-east of Pulo Rondo. Pulo Way is about 11 miles long in a N.W. and S.E. direction, 2 to 6 miles broad, high and mountainous, the highest peak being to the westward; the island may be seen from a distance of 36 miles. Its south side is steep-to in most places, there being no change in colour from the deep ocean blue of the water at 2 cables from the shore, but at other parts of the south side there are soundings near the shore. There is a small rock, dry at low water, about half a mile distant from the south-west point.

In a bay about a mile deep on the south-east side of the island there are 30 to 60 fathoms, sand, where possibly anchorage may be obtained. Fresh water may be procured at the head of the bay near a sandy beach. There is a sulphur mine in the vicinity.

Pulo Way is under cultivation, and there are said to be 300 or 400 inhabitants on the island.

BENGAL PASSAGE, formed between Pulo Brasse and Pulo Way, is about 11 miles wide, and convenient for vessels sailing from Acheen head to the north-west, as the current generally sets out in that direction, but vessels bound into Acheen road seldom proceed through Bengal passage unless with a steady commanding breeze, there being no anchorage in the passage except near Pulo Brasse. During the south-west monsoon the current sets round Pulo Brasse to the westward frequently at the rate of 25 to 40 miles a day.

ACHEEN BAY and RIVER.—The bay of Acheen is formed between the eastern part of Acheen head and the entrance of Acheen river. The shores are low and wooded and skirted by a bank on which depths of 5 fathoms are found at distances varying from 5 to 7 cables from the shore. In the western part of the bay is Pulo Tuan, a small island joined to Acheen head by a rocky plateau 6 cables long.*

Acheen river falls into the sea by several mouths, separating the low country into islands, which are inundated during the rainy season. The principal mouth, which is situated about 5 miles to the eastward of Acheen head, is about 100 yards wide, and is a foot deep on the bar at low water. At high water, when there is a depth of 6 feet on the bar, vessels of 20 or 30 tons burthen can enter the river. In April the water at the entrance was constantly fresh, as the water was always running out.†

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* *See* plan of Acheen bay and river on Admiralty chart No. 219; scale, $m = 2$ inches.

† Lieutenant H. P. Knevitt, H.M.S. *Leven*, 1865.

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From a distance the entrance to Acheen river may be known by two trees, one with a mushroom-shaped top, on the eastern bank, and the other a leafless cocoa-nut tree on the west bank. A house with a flagstaff is situated near the entrance, and a red flag is hoisted on the approach of foreign vessels. The harbour master resides near the river's mouth.*

Anchorage.—The usual anchorage off Acheen river is in 8 or 9 fathoms with the entrance bearing S. ½ E. to S.S.E., distant about a mile. During the south-west monsoon, which prevails from May to October, vessels in this berth are sheltered from wind. During the north-east monsoon the winds are seldom strong, but N.W. winds sometimes blow with great force through Bengal passage, and render the anchorage insecure. In the anchorage off Acheen river land and sea breezes often blow during both seasons, but the land breezes do not extend beyond the islands.

Town.—The town of Acheen is situated on the left bank of Acheen river, about 4 miles from the entrance. Plentiful supplies of cattle, poultry, and water could be procured here in 1870, with vegetables and fruit during the proper season. Gold dust, camphor, and small horses of an excellent breed may be obtained. Sheep are scarce.

MALACCA PASSAGE, formed between Pulo Way and the Sumatra coast, is 7 miles broad, and has in it the islet Malora, or Pulo Buru, situated at one fourth the width of the channel from the Sumatra shore, and 3 miles W.N.W. from Pedro point the islet is fringed by a reef which extends a quarter of a mile in all directions; there is a depth of 8 fathoms within half a mile of the islet. On its summit there is a solitary cocoa-nut tree, visible 6 or 8 miles. †

The passage on either side of Pulo Buru is safe; that on the north-west side is deep, whilst that on the south-east has from 9 to 13 fathoms water, but vessels should not shoal less than 10 fathoms in approaching Pedro point. Malacca passage is the best route to approach Acheen from the north.

The COAST of PEDIR, recently surveyed by officers of the Netherlands navy, extends from Pedro point in a general E. ¾ S. direction about 120 miles to Diamond point, its eastern boundary. This coast is low in several places close to the sea, but the country a little inland is all very high.

During the months of December, February, and part of March, the weather is generally fine, with little or no rain, the winds varying from N.E. to E.S.E. and S.E., and the thermometer ranging from 79° to 82°.

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* Lieutenant H. R. E. Grey, H.M.S. *Algerine*, 1870.

† Lieutenant H. P. Knevitt, H.M.S. *Leven*, 1865.

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The tides near the shore are regular, but not very strong. In the offing, during these months, there is generally a set to the westward, so that it is advisable for sailing vessels, in proceeding to the eastward during these months, not to go far out of soundings, but keep near the shore, and anchor for the tide, should it not be favourable, taking advantage of the land wind which generally sets in between 8 and 9 p.m. and continues through the night.

The villages along the coast are small, generally containing sixty to eighty huts, which are constructed of bamboos and mats. The men are mostly well dressed, and carry a knife, or kris, in their waist. They are not to be trusted much if any temptation be in the way. Great numbers of the natives go out daily to fish, and the entrances to the different creeks leading to the villages, which are not perceptible from the anchorage, may be found by observing the canoes enter on their return from fishing. It may be generally remarked during this season that if the canoes are not seen out fishing before 7 or 8 a.m. that a fresh breeze may be expected during the day.

On this part of the coast, supplies, such as fowls, eggs, and fruit, are scarce, but goats may be procured. Large herds of cattle may be seen grazing on the plain, but the natives have an objection to part with them.

Water.—Fresh water may be procured in most of the creeks between Sawang and Telok Samoi, but to the westward of Sawang the creeks are all salt water.

PEDRO POINT (Tanjong Batu), the north point of Sumatra, is situated 13 miles E.N.E. from Acheen head, and may be approached to a depth of 9 or 10 fathoms at the distance of a mile. The point is low, terminating in a green slope with a few trees, and is fringed by a rocky shoal which extends a quarter of a mile seaward. A bluff formed by high land is situated 1½ miles W.S.W. from Pedro point. The bottom in this vicinity is rocky, and the soundings do not extend more than 1½ or 2 miles from the shore.

Tanjong Batu Putie, or White cliff, lies E. ¼ S. 12 miles from Pedro point, and may be known by a small tree and a ruin near its extremity; the point is conspicuous when seen from the eastward. Between Pedro point and Tanjong Batu Putie is formed Deep Water bay, at the bottom of which is Ryah village, with soundings of 20 fathoms within a quarter of a mile from the shore. The soundings do not in this part extend more than 2 miles from the shore. Tanjong Batu Putie is nearly steep-to.

Batu Pedir, 18 miles E.S.E. from Tanjong Batu Putie, may be known by some bushy trees on its summit, and by the Golden mountain (Ya Mura) which bears from the point W. by S. ½ S.

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DIRECTIONS.—In sailing from Acheen along this part of the coast a vessel should keep near the shore, as in most parts anchorage may, if necessary, be found, and there is seldom any hidden danger more than half a mile from the shore. Also the bank of soundings is steep-to, with westerly and variable currents outside its limits. Calms are more prevalent than when the vessel is in soundings. Pedir point may be approached to a depth of 10 fathoms at the distance of half a mile. See foot note at page 5.

Golden mountain (Ya Mura), W. by S. ½ S. 14 miles from Batu Pedir, is a high regular cone 7,546 feet high. There is a smaller mountain about 5 miles to the eastward of the Golden mountain, called the Orphan (Ya Muree), or mount Pedir, having green sides and darkly-wooded summit. The surrounding country appears well cultivated. These two mountains are useful landmarks. Golden mountain has been seen at a distance of 88 miles.

From Batu Pedir the coast trends to the south-east to Batu creek 4 miles distant, and to Bungala creek, 6 miles distant from the former. Bungala creek may be known by a few tall cassarina trees near its entrance.

PEDIR CREEK is situated 8 miles to the south-east of Batu Pedir. The entrance of the creek dries at low water, and is not easily discovered, but it may be found by steering from the eastward towards Orphan mountain until a large village is seen in a gap in the trees which line the coast. Two miles to the north-west of the village is Pedir creek. From the entrance the creek winds for a mile and a half, when it becomes so narrow that there is hardly room for a boat. About a quarter of a mile farther up is a village and an old Portuguese fort, mounting 11 guns.* The exports of Pedir are betel-nut and pepper.

There is good anchorage near the coast in the neighbourhood of Pedir creek about a mile from the shore.

Burong creek.—The entrance of this creek, which is situated 4 miles to the south-east of Pedir creek, may be known by a flagstaff in the centre of the village. The creek is very narrow, and the bar at its entrance very shallow, only passable at high water. Burong has become a chief place for trade on this coast; it is much frequented by vessels from Coromandel coast.

Two and a half miles to the south-east of Burong creek is Ayerlaboo creek.

SAWANG or Endjung CREEK.—The entrance to this creek is situated 17 miles to the south-east of Batu Pedir cape, and may be

* Navigating Lieutenant F. J. Gray, H.M.S. *Nassau*, 1872.

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known by two groves of cocoa-nut trees situated near the entrance. The bar has a depth of 4 feet at low water, the bottom seaward deepening gradually to 10 or 12 fathoms half a mile off shore. A long spit extends from the north point of the entrance and dries at half tide. The rise and fall of tide is 7 feet.

The village of Sawang, consisting of 200 houses, is situated nearly 2 miles from the bar of the creek, and like other Malay villages is built in a swamp. Small supplies of provisions may be procured.*

MURDU POINT, lying S.E. ¾ E. 24 miles from Batu Pedir, is low and sandy with a few small trees; a run of water, resembling when at a distance a path in the valley, appears very plain during the rainy season. A conspicuous grove of trees is situate 1½ miles to the westward of the point. The village of Murdu is situated half a mile from the sea on the banks of a small river. The anchorage off Murdu is in 18 fathoms a mile from the shore, with the village bearing South. The water shoals suddenly from 10 to 2 fathoms.*

Samalangan creek (entrance of) is situated 7½ miles to the eastward of Murdu point. The entrance cannot be distinguished from the sea, but it is situated 1½ miles to the westward of two large trees which are near the beach. On either side of the entrance there is a small fort.

The anchorage off Samalangan is in 12 to 15 fathoms a mile off shore with Murdu point bearing W. by N., Rajah point E. by N.

Rajah point having a high grove of trees near its extremity is situated in lat. 5° 15′ N., long. 96° 28′ E., and forms with Murdu point (12 miles to the westward) a bight which off Samalangan creek is 1¾ miles deep, and has a depth of 24 fathoms decreasing gradually towards the shore. Rajah point may be approached to a depth of 10 fathoms; but E. ¼ S. 2½ miles from the point there is a rocky patch having 6 fathoms water and 12 to 15 fathoms close-to.

Elephant mountain or Friar's hood, in long. 96° 38′ E. distant 10 miles from the nearest part of the coast, is an isolated and conspicuous landmark, visible nearly 40 miles.

PASSANGAN POINT and CREEK.—Passangan point in lat. 5° 18′ N., long. 96° 51′ E. 22 miles E. ¾ N. from Rajah point, is low, sandy, with a few cocoa-nut trees near its extremity, and is in line with Elephant mountain bearing S.W. ¼ S. Between Rajah point and Passangan point the shore may be approached to a depth of 14 fathoms. Passangan point is steep, there being 30 fathoms within half a mile of the beach.

* Mr. Benjamin Renaud, Master R.N., H.M.S. *Amazon*, 1851.

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There are two entrances to Passangan creek; the principal one is situated 4 miles to the westward of the point, the other half a mile eastward of the point; both entrances are shallow and only passable by boats at high water.

Five miles to the eastward of Passangan point there is a high square grove of trees situated near the entrance of Klumpang Dua creek.

Goma-Goma or **Agum-Agum** point is distant 9½ miles East from Passangan point the coast between forming a bight, the shore of which may be approached to 10 fathoms. Agum-Agum point is low with a little jungle on it and vessels should not shoal less than 14 or 12 fathoms in approaching it. Nearly a mile W. by N. ½ N. from Goma-Goma point and nearly three-quarters of a mile off shore is a sunken rock having 4 fathoms water close-to.

Two and a half miles to the eastward of Goma-Goma point a belt of high cassarina trees commences and continues nearly as far as Telok Samoi, which is distant 13 miles from Goma-Goma point.

Krang Guku or **Krung-Koqua** is a village near a creek which is situated 5 miles to the eastward of Goma-Goma point. There is good anchorage westward of the village in 10 fathoms, mud; there are 4 fathoms close to the breakers.*

TELOK SAMOI VILLAGE, in lat. 5° 12′ N., long. 97° 11′ E., is situated in a bay about 20 miles to the westward of Diamond point and contains about sixty huts, and a mud fort having a few old guns. The village in which the Rajah's flag is hoisted is on the south side of the creek of Telok Samoi, the entrance of which is dry at low water; the village is only approachable in a boat at high water.* Telok Samoi may easily be recognised after a first visit by a remarkable ridge of hills which are 4 miles long, 300 to 500 feet high, and commence a short distance west of the village; these hills are cleared of trees and the light green grass renders them distinguishable. A rounded piece of land called Telok Samoi point is marked by a clump of tall cassarina trees which are easily seen on a southerly bearing.

Entering the bay from the north-west the shore may be approached to any convenient distance, as there are soundings of 7 and 10 fathoms within 100 yards of the beach. There is good holding ground in 10 fathoms, stiff blue mud, about half a mile from the north-western shore of the bay; but the anchorage is exposed during the north-east monsoon and there is no shelter from the sea breeze; there is shelter for small coasting craft inside a spit.

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* Navigating Lieutenant F. J. Gray, H.M.S. *Nassau*, 1872.

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Tides.—It is high water, full and change, at Telok Samoi at 12h.

Supplies.—Water and provisions may be obtained at Telok Samoi, but vessels should be on their guard against the natives, who, together with the natives of other villages on this coast, are reputed to be treacherous.

DIAMOND POINT or **Djambu Ayer.**—The coast from Telok Samoi extends in an E.N.E. direction 20 miles to Diamond point; the intervening coast is low, flat, covered with trees and skirted by a shoal bank on which soundings of 3 fathoms will be obtained at one and 1½ miles from the shore. The trees on Diamond point being of unequal height and higher than those on the adjacent land makes the point appear like a low, sloping island when seen at a considerable distance, although the ground is very little elevated above the level of high-water spring tides. A high table mountain visible from the offing in clear weather is situated S.S.W. from Diamond point.

Several rivers fall into the sea between Telok Samoi and Diamond point. "The character of these rivers which run through the alluvial plain," remarks Lieutenant H. R. E. Grey, R.N.,* "appears nearly always the same, namely, a bar at the entrance, only passable by very small vessels, and deep water clear of dangers in the river itself."

Shoals.—The coast may be approached to soundings of 7 fathoms, except near Diamond point, where on a bearing W. ¼ S. and distant 5¾ miles from Diamond point is a shoal of 12 feet, clay, 20 yards in extent and with 7 fathoms close-to. From the shoal a small gap in the jungle bears S. 1° E., and Pidada or Cartoy creek (at the west extreme of a thick belt of jungle) S.S.W. This place is much frequented by fishermen during fair weather.

A spit extends from Diamond point nearly a mile in a northerly direction; it has a depth of 18 feet on its outer edge, deepening suddenly to 8 and 15 fathoms, and therefore vessels should not shoal less than 10 fathoms n approaching the spit, especially during the north-east monsoon, when a heavy swell will be experienced. This depth will be found at a distance of 2 miles to the northward of the point; at 3 miles there are 20 fathoms, deepening but not very regularly to 30 and 40 fathoms at 5 miles from the shore.

Tides.—It is high water, full and change, at Diamond point at 12h.; springs rise 9 feet. The flood sets to S.E., the ebb to the N.W. at the rate of 2 miles an hour. On the coast westward of Diamond point, as before remarked, the tidal streams are not strong.

The COAST from Diamond Point to Brewers Strait.—From Diamond point to Arroa islands the coast is low and woody, and

* H.M.S. *Algerine*, 1870.

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has several rivers, towns, and villages scattered along it. From 40 to 50 miles in the interior is a high chain of mountains, which may occasionally been seen in clear weather. The principal towns are Prauhilah, Lanksa, Sampai, Lankat, Dehli, Batoo Barra, and Assarhan, but these places are but collections of miserable huts, and their inhabitants remarkable neither for industry nor honesty. It is recommended that vessels when meeting with native proas be on their guard, as their piratical depredations are not always confined to native coasting vessels.

The shore is often difficult of approach on account of shoals which in some places extend a distance of 8 or 9 miles to seaward. Towards these shoals, however, the soundings are generally a guide; the bottom consists of mud, sand, or sand and mud mixed.

Tides.—The flood tide sets along the coast to the S.E., and the ebb to the N.W., but varying a point or two according to the direction of the coast. At springs the tides set at the rate of 2 or 3 knots, but they are greatly influenced by the prevailing winds. The ebb is generally stronger and of longer duration than the flood, but, when the distance from the shore is considerable, seldom exceeds $1\frac{1}{2}$ knots.

Winds.—Regular land and sea breezes are experienced on this part of the coast in February, March, and April.

During the strength of the north-east monsoon this coast ought not to be approached, there being a heavy swell rolling on it at that time.

PRAUHILAH POINT (Oujong Prauhilah).—The coast between Diamond and Prauhilah points extends in a south-east direction, is nearly straight, and is intersected by numerous creeks and small rivers.

Rock reported.—In lat. 5° 0′ N., long. 98° 18′ E., about 25 miles E. by N. $\frac{1}{2}$ N. from Oujong Prauhilah there is (1875) said to be a small rock just above water. The existence of this rock requires verification.

Simpang Olim river, 8 miles to the south-east of Diamond point, is almost closed by a bar of sand; the entrance is about $1\frac{1}{2}$ cables in width. A narrow channel marked by stakes leads into the river which has 9 to 15 feet water inside.*

Arakundur river, 4 miles to the south-east of Simpang Olim is somewhat similar to the latter, the entrance having about 3 feet at low water.†

Edie Bisar, a small river 24 miles to the south-east of Diamond point, has a depth of 6 feet on its bar at low water; the channel is marked by stakes.‡

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* *See* plan of Simpang Olim on Admiralty chart No. 219; scale, $m = 1$ inch.

† *See* plan of Arakundur river on Admiralty chart No. 219; scale, $m = 2$ inches.

‡ *See* plan of Edie Bisar river on Admiralty chart No. 219; scale, $m = 3\frac{1}{3}$ inches.

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Raya or Raija river, 10 miles to the south-east of Oujong Prauhilah, has an entrance 2½ cables wide with 4 feet on the bar at low water and 22 feet inside.*

The coast between Diamond and Prauhilah points is safe to approach to soundings of 10 fathoms, which depth will be found at a distance of 2 miles from the shore, except near Prauhilah point, from which a reef extends N.N.E. and N.N.W. a distance of 4 miles. There is a depth of 10 fathoms 5 miles north and 4 miles N.N.E. from the point, outside which the water deepens quickly to 20 and 25 fathoms. Eastward of the point there are 4 fathoms at 2½ miles distant, and 10 fathoms at 3½ miles.

The entrance to Prauhilah river is on the north side of Prauhilah point, and is almost dry at low water, but inside there is a depth of 12 feet for several miles up, and it is said to have communication with Quala Lagoo. A small fishing village is situated at a considerable distance from the entrance of the river.

LANKSA BAY.—The coast to the southward of Prauhilah point, as far as Raya river, is safe to approach to a depth of 5 fathoms at a distance of 1½ miles from the shore; thence to Oujong Praulin, the north-west point of Lanksa bay, vessels should not shoal less than 16 or 20 fathoms, as reefs on which the sea breaks heavily, project from Oujong Praulin a distance of 4½ miles to the northward and eastward. Praulin point is low, but can be distinguished on any bearing from S.W. by S. round to the southward. With the point bearing South a vessel should not, in approaching the reef, shoal less than 10 fathoms. The eastern part of the reef should not be approached nearer than soundings of 19 fathoms.

Lanksa bay is formed between Oujong Praulin on the north-west side and Oujong Lanksa on the south-east; the distance between these points is 4½ miles, and the depth of the bay is also about 4½ miles. It contains numerous shoals, between which there are narrow boat-channels leading into the various rivers that discharge into this bay. Near Oujong Lanksa, but separated by a channel 300 yards wide and 5 fathoms deep, lies Pulo Laga Tojoo, a small island about a mile in extent, and having a reef which extends from it three-quarters of a mile to the northward and eastward. This island can only be distinguished from the mainland in coming from the south-east.

The entrance to Lanksa river bears South (nearly) from Pulo Laga Tojoo; there is a narrow channel on the north side of that island, but the best channel to the river is south of Pulo Laga Tojoo and has 9 feet least water. These channels, however, are only practicable for vessels of small draught, and, as there are no leading marks, boats should be kept ahead

* *See* plan of Raya river on Admiralty chart No. 219; scale, $m = \frac{3}{4}$ inch.

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sounding. In the entrance of the river lies Pulo Rawa, an island about half a mile in extent, westward of which the river is only 300 or 400 yards wide. The town is said to be at a considerable distance (about three hours pull) from the entrance of the river ; the inhabitants cultivate rice, pepper, and rattans.

A vessel intending to send her boats to Lanksa should anchor in 9 or 10 fathoms water, with Oujong Lanska bearing S.W. by W. distant 2½ miles.

From Oujong Lanksa the coast extends S.E. by E. ¼ E. 15 miles to Oujong Tanolang or Tamiang; midway there is an island named Pulo Roquit, which is safe to approach on the north-eastern side to soundings of 10 or 12 fathoms. Between Pulo Roquit and Oujong Lanksa the shore is skirted by a bank, which extends one or 2 miles off shore, and has from 12 to 18 feet on its edge; the soundings decreased very gradually towards the bank. South-east of Pulo Roquit vessels should not approach the shore with less soundings than 17 fathoms, and off Tamiang to 20 fathoms, as the skirting bank is steep.

OUJONG TANOEANG is in lat. 4° 25′ N., long. 98° 16′ E. ; a reef projects from the point in a N.N.E. direction one mile, and has 18 or 20 fathoms close to its edge; another reef, on which the water shoals very suddenly, extends N.W. by N. from the point. The point should not be approached nearer than 2 miles on account of the strong undercurrents, which are likely to set the vessel into the small bay which is formed to the westward of Oujong Tanoeang.*

Tamian river, west of Oujong Tanoeang, has a depth of 4 feet on its bar at low water. The town of Tanoeang is situated about 10 miles up the river, which has a rise of 2 feet at the town.† There is a dangerous reef off the point to the southward of the entrance.‡

Tides.—It is high water, full and change, off Oujong Tanoeang at 0h. 30m., rise of tide 6 to 9 feet. The water is quite fresh on the surface to a distance of 2 miles from the shore.

Soundings.—There is a bank of small extent bearing E. by N. ¾ N. 4½ miles from Oujong Tanoeang. The least water found on the bank was 13 fathoms : there are 20 and 23 fathoms close-to.

The coast between Oujong Tanoeang and Pulo Tapaconda forms a bay

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* The surveying vessel *Krishna*, Lieutenant Henry Jackson, of the Indian Navy, in December 1859, anchored about half a mile from the breakers and with Tanoeang point bearing S. 28° E., distant 2⅓ miles. On weighing with an ebb tide which was apparently setting to N.E. 2 knots on the surface of the water, the vessel was observed to drift towards the reefs, and it was only on the fourth day, by kedging in deep water, that she could be extricated from this dangerous position.

† *See* plan of Tamian river on Admiralty chart, No. 219 ; scale, $m = \frac{3}{4}$ inch.

‡ Lieutenant H. R. E. Grey, R.N., H.M.S. *Algerine*, 1870.

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about 30 miles broad and 9 miles deep. Nearly in the bottom bay are two large islands: the northern one is called Pulo Sampai, on the south extreme of which is a small town of the same name belonging to the Rajah of Acheen. This bay is fronted by mud-banks which extend in some places 5 and 7 miles off shore, towards which the soundings decrease very gradually; the banks may be safely approached to 6 fathoms, excepting near Tamiang point and to the northward of Lankat river.

Pulo Sampai.—Leading to Pulo Sampai there is a safe channel, at the entrance of which, bearing from the south extreme of Pulo Sampai N.E. ½ E. 6½ miles, there are 9 feet least water. Thence the channel, nearly straight to Sampai, is about half a mile in breadth, and has deep water. The channel is said to continue to Kaya-la-pun river; this however was not ascertained by Lieutenant Jackson, who surveyed this part of the coast in 1860, as the Rajah of Sampai objected to surveying operations being carried on westward of the town.

Pulo Tapacouda.—Pulo Tapacouda is a small islet covered with trees off the mouth of Tapacouda river; the southern extreme of the islet is in lat. 4° 0′ N., long. 98° 32′ E. On the west side of the entrance to Tapacouda river there is a clump of trees.

LANKAT RIVER.—From the entrance of Lankat river, which is about 3 miles westward of Pulo Tapacouda, a bank with dry patches in some parts extends north and north-east 5 or 6 miles. A vessel should not shoal less than 11 fathoms in approaching this bank from the north, and 12 or 14 fathoms from the north-east, as the soundings decrease very suddenly inshore of those depths.

To the north-east of Pulo Tapacouda 5 miles and east of the same island 6 miles the soundings are 12 and 13 fathoms. Within these distances there is a bank of irregular soundings, 3 to 9 fathoms; over the northern part of this bank it is safe to pass.

The coast from Pulo Tapacouda to Oujong Beitin Chama forms a slight bay and is fronted by extensive banks; it may, however, be safely approached to soundings of 10 fathoms.

Oujong Beitin Chama, in lat 3° 54½′ N., long 98° 40′ E. forms the northern extreme of the bay in which Dehli river is situated and bears from Tapacouda island S.E. by E. 10 miles distant. The point should not be approached nearer than soundings of 10 fathoms.

BALAWAN and DEHLI RIVERS.—Dehli river entrance in lat. 3° 46′ N., long. 98° 42′ E., is about 300 yards broad and fronted by an extensive shoal bank to the distance of 4 and 5 miles; towards the bank the soundings decrease very regularly. The entrance to Balawan river is a mile N. by W. from that of the Dehli. Balawan and Dehli rivers, so called, communicate with each other by a channel having 9 to 12 feet

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water, and form an island; the adjacent land is low and wooded. The entrances to the two rivers are divided by a sand-bank almost dry at low water, and cannot easily be distinguished.*

Balawan river entrance is marked by fishing stakes and by beacons 4 feet above high water on either side of the entrance; the beacons on the starboard hand (entering) are white with round basket tops; those on the port hand are black and surmounted by crosses. The river has a depth of 8 feet on the bar at low water with 3 to 5 fathoms inside. By keeping the white beacons about a cable distant on the starboard hand the passage is easy, and there are no dangers in the river up to the anchorage except one shoal on the port hand, on the outer edge of which there is a beacon. The best anchorage is in the fork of the river in about 21 feet water, near the coal sheds. Above the junction of the Balawan and Dehli rivers the river is shallow, and at low water navigable only for the smallest boats; but above the town of Dehli or Labuan the river deepens and is navigable for large boats for many miles.†

Dehli river entrance may be discovered in line with a remarkable gap in the mountains bearing S.W. ½ W., and may be known by the numerous fishing stakes in its neighbourhood. About 4 miles to the southward of the entrance there is a conspicuous group of high trees.

Vessels proceeding to the town of Dehli (about 3 miles up the river) enter through Balawan river as it is deeper than Dehli river which has only 4 feet on its bar and is very shoal inside. A Malay village is situated near the entrance of Dehli river and pilots are there procurable.

Dehli is a small village in the possession of the Dutch, and in 1873 was rising in importance. Tobacco is the principal article cultivated. Ponies and bullocks may be procured. The river swarms with alligators.

Outer anchorage.—Vessels should anchor in 9 fathoms, with the entrance of Dehli river in a line with a gap in the mountains bearing S.W. ½ W., about 6½ miles from the entrance.

Tides.—It is high water, full and change, in Balawan river at 3h.; rise of tide 7 to 10 feet.‡ The tidal streams run from one to two hours later.

Oujong Bunga Bunga.—From Dehli river the coast extends in an E.S.E. direction 17 miles to Oujong Bunga Bunga, and may be approached in any part with soundings of 6 fathoms. Oujong Bunga Bunga may be known from the offing by its grove of high trees, the third grove from Dehli river.

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* *See* plan of Balawan river on Admiralty chart, No. 1,353; scale, $m = \frac{3}{4}$ inch.

† Remarks on Balawan river by Commander F. Stirling, H.M.S. *Thistle*, July 1875.

‡ According to later information, derived from a sketch of Balawan river by the officers of the Dutch corvette *Waterguese*, the rise is said to be about 5 feet.

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DEHLI BANK is about 23 miles in length N.W and S.E., and varies from 2 to 4½ miles in breadth. Its south-east extreme is in latitude 3° 42′ N., long. 99° 5′ E. with the following bearings :—Pulo Varela peak N. 80 E. (*true*), a high tree on the northern extreme of a long straggling grove to the south-east of Oujong Bunga Bunga S. 27° E. (*true*), the grove on Oujong Bunga Bunga S. 67° W. (*true.*) The north-west extreme of the shoal is in lat. 4° N., long. 98° 50′ E., and has from 7 to 11 fathoms.

Bungan shoals, which form the dangerous part of Dehli bank, are situated on the southern extreme of the bank, and consist of two narrow ridges of sand, which are 3 to 4 miles long in a N.W. and S.E. direction, half a mile broad, lie nearly abreast of each other, and are separated by a channel which is 2 miles wide, and has 6 to 9 fathoms water.

The least water on the western ridge is 6 feet, from which spot Pulo Varela peak bears N. 85° E. (*true*), distant 26 miles; a high tree on the north extreme of a long straggling grove to the south-east of Oujong Bunga Bunga, S.32° E. (*true*), 13 miles, and the grove on Oujong Bunga Bunga, S. 46° W. (*true*), 6½ miles.

On the shoalest part of the eastern ridge there is a depth of 9 feet, from which part Pulo Varela peak bears East (*true*) distant 25 miles; a high tree on the north extreme of a long straggling grove to the south-east of Oujong Bunga Bunga, S. 23° ½ E. (*true*), 14¼ miles; and the grove on Oujong Bunga Bunga, S. 40° W. (*true*), 9 miles.

Pulo Varela peak bearing E. ¼ S. leads to the northward of Bungan banks, and the same object bearing E. by N. ⅛ N. leads to the southward of them. The high tree * on the north extreme of a long straggling grove of trees to the south-east of Oujong Bunga Bunga, bearing S. by E. ¾ E., leads to the eastward, but this tree can only be seen in clear weather. The centre of the grove on Oujong Bunga Bunga bearing S. by W. will lead in 5 fathoms to the north-west of Bungan shoals, and clear of all dangers on Dehli banks. It is not advisable to shoal less than 18 fathoms in passing these banks at night-time.

There is a clear channel, 3½ miles wide and having 5½ to 10 fathoms water, between Bungan shoals and the coast, but the shore to the southward of Oujong Bunga Bunga should not be approached nearer than 3 miles, as there is a bank having 9 to 12 feet water extending parallel to the shore for 5½ miles; there is deep water between this bank and the shore.

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* The high tree is among a small cluster, and is very little higher than the adjacent trees. The foreshore is low and deceptive in appearance, being backed by a range of mountains which have many peculiarly-shaped peaks.—Navigating Sub-Lieutenant G. F. Whitmore, R.N., H.M.S. *Midge*, 1873.

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From Oujong Bunga Bunga the coast extends S.E. by E. ½ E. 35 miles to point Mattie, and may in most places be approached to 2 or 3 miles in from 4½ to 7 fathoms water, but the soundings outside are very irregular, with overfalls. There are several rivers in this part of the coast, the entrances to which are passable only to boats.

Point Mattie.—The north-east extreme of this point, in lat. 3° 21′ N., long. 98° 28½′ E., forms the northern extreme of Batoo Barra bay, and may easily be known by its high grove of trees. Five miles northward of point Mattie the soundings are from 12 to 14 fathoms, and thence to the southward shoals very suddenly to 5 and 2 fathoms on a sandy spit dry at low water, and which extends from Mattie point one mile to the north and north-east.

Tides.—It is high water, full and change, off point Mattie at 3 h.; springs rise 7 to 10 feet. The tidal streams run from one to two hours later, and set at the rate of 2 to 3 miles an hour at springs.

MATTIE SHOAL is a dangerous sand-bank 6 miles long, in an E.S.E. and W.N.W. direction, one mile broad, and having from 6 to 12 feet water. There is a safe channel between the shoal and the mainland, the narrowest part, 1¼ miles, being off point Mattie. From the north-west extreme of Mattie shoal Pulo Varela peak bears North (*true*), point Mattie S. 26 W. (*true*), Pulo Pandan peak N. 81° E. (*true*).

A mile southward of the south-east extreme of Mattie shoal is a small patch having 16 feet water. It is easily cleared by attending to the bearings of Pulo Salanama and a remarkable tree near Batoo Barra.

Batoo Barra river.—The entrance to this river, situated 9½ miles S.E. from point Mattie, is fronted by a mud-flat which extends a considerable distance north-west and south-east, and, within a depth of 18 feet, is from 2 to 4 miles off shore; this flat has regular soundings, and extends to within 4½ miles of Pulo Salanama. A wide spreading remarkable tree is situated about 1¼ miles to the westward of the entrance of the river.

Batoo Barra river is about 300 yards wide, with regular soundings to the dry banks at its mouth. At a short distance from the entrance the river divides into two branches, one to the eastward and the other to the westward; these branches are mere creeks and are almost dry at low-water. About a mile up the western branch is a town where the chief rajah resides; on the banks of the eastern branch is another town, and there are said to be other towns farther up the river. The people cultivate rice and rattans. Elephants abound inland, but the natives are ignorant of the method of catching them; horses also are plentiful. Goats and poultry may be procured at reasonable prices.

European vessels discontinued visiting this place for many years, owing to the perfidious conduct of the Malays who cut off several vessels which

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touched here to trade. Nevertheless the people of Batoo Barra appear more industrious and inclined to trade than is usual with other inhabitants along the coast; and they carry in their proas to Penang and Malacca the ratans, pepper, and other articles produced here.

PULO VARELA, a small island, with a peak about 600 feet high, may be seen in clear weather at a distance of 28 miles: its peak is in lat. 3° 46′ N., long. 99° 29′ E., and about 22 miles from the nearest part of Sumatra shore. Off the north-west point lies an islet or rock, and another off the south end, but which is joined to the island at low water by a narrow neck of land. At the south end of Pulo Varela, in a little cove, water may be procured from a small run; there is anchorage a mile off the south-east part of the island in 12 to 18 fathoms. The soundings near the island on the inside are 18 to 29 fathoms, and towards Bungan banks 25 to 18 fathoms.

Plenty of firewood, and good pine spars may be cut here, but boats landing should be on their guard against the Batoo Barra people from the adjacent coast, who frequently lurk about the island in their proas in search of plunder, or else to dry their nets, and they have more than once massacred or carried into captivity the crews of boats who have landed here to procure wood and water.*

Banks.—To the northward of Pulo Varela is a bank having 6 to 10 fathoms water; its south extreme bears N. by W. ½ W. 7 miles from Pulo Varela, the bank thence extends in a N.W. ¾. W. direction for 7 miles, and is a mile broad. It has been stated that there is a depth of only 2 fathoms on some parts of this bank, but 6 fathoms was the least water found by the officers of the *Krishna* during their survey in 1860.

Another bank, having 8 to 10 fathoms, lies with its north extreme bearing S.W. by W. 4 miles from Pulo Varela, and thence extends in a S.E. direction 5½ miles, with a breadth of 1½ miles.

A third and very extensive bank has its northern extreme bearing from Pulo Varela S. by W. 13 miles; its south extreme bears from Pulo Pandan W.S.W. and N.W. 4½ miles from Pulo Salanama. Five fathoms was the least water found on this bank, the shape of which is irregular, being about 17 miles long in a general N.W. and S.E. direction, and 2 to 5 miles broad. Between the bank and Mattie shoal there are 12 to 20 fathoms.

The BROTHERS are two small wooded islands lying N.N.E. and S.S.W. from each other, a quarter and a half mile long respectively, and

* Captain Quin, R.N., H.M.S. *Raleigh*, states that the people from Batoo Barra, who with their families resort to this island, remain some three months in each year to catch turtle and preserve their eggs; and that they also prepare dry fish-roes and fish for the markets of Penang, Malacca, and Singapore.—*Horsburgh's Directory*, vol. 2, eighth edition, page 89.

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may be seen from a distance of 15 miles. The northernmost, called Pulo Pandan, is in lat. 3° 25′ N., long. 99° 45′ E., and bears from Pulo Varela S. 36° E. (*true*) 26 miles ; this island is encircled by shoal and rocky ground to the distance of half a mile. The southernmost, called Pulo Salanama, bears S. 21° W. (*true*) from Pulo Pandan distant 5 miles. Some rocks extend a quarter of a mile from the north end of Pulo Salanama, and off the south-east end there is a small islet having a remarkable single tree on it.

Assarhan river (lat. 3° 1′ N., long. 99° 51′ E.), 22 miles to the south-east of Batoo Barra, has a mud-flat extending from its entrance 8 miles to the north-east, the soundings upon which decrease regularly towards the shore. This flat is a continuation of the flat already mentioned as extending a considerable distance along the shore N.W. and S.E. of Batoo Barra river.*

Between Assarhan and Reccan rivers care is required not to approach too near the coast, as the mud-flats extend a considerable distance off shore, and the lead gives little warning. At the mouth of Lidang bay, 20 miles to the south-east of Assarhan river, the flat extends 11 miles from the bottom of the bay.

RECCAN, or RAKAN, RIVER has at its entrance two low wooded islands, Pulo Lalang Besar, in lat. 2° 12′ N., long. 100° 35′ E., and Pulo Lalang Kechel. The former is the larger of the two islands, and bears N. by W. ½ W. from the smaller one 2¼ miles distant. There is a passage of 9 to 12 feet water between them leading into the river.

Reccan river is about 15 miles broad at its mouth, decreasing in breadth, 8 or 9 miles up, to 4 miles, and continuing afterwards a breadth of 2 miles to the junction of its two tributaries, Bangka and Tana Putie. On the left bank of the river, a few miles up, is a scattered village named Bangka, the inhabitants of which are not to be trusted.

Tides.—It is high water, full and change, in the entrance of the river at 6h. The river has a rise and fall of 26 feet, and is almost dry at low-water springs. The tides run at the rate of 5½ miles an hour and produce a bore at springs. The velocity of the stream is much greater a few miles farther up the river.

From the islands at the entrance the river extends in a S.E. by S. direction 31 miles, when it takes a more easterly direction, and is called Tana Putie river. At this part of the river also is situated the town Tana Putie.

* At its mouth Assarhan river is 1,600 yards wide, but 7 miles farther up, where it receives a tributary called the Silau (dazzling), it narrows to one third of this breadth. Fronting its embouchure there is an extensive mud-flat, and at low-water spring tides the depth in the channel of the river itself does not exceed 12 feet. — Crawfurd's *Descriptive Dictionary of the Indian Islands and adjacent Countries*. London, 1856.

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The river, which is 1½ miles wide here, is said to take its rise from the mountains, and is shoal and from the rapidity of the tides dangerous. Several large and populous villages subject to the Rajah of Siak are said to exist on its banks.

The eastern bank of Reccan river projects to the north-west, forming the headland of Oujong Perbabean, from which a mud-flat extends to the N.W. and N.N.W. about 10 miles; upon this flat the soundings decrease regularly.

Caution.—When clear to the eastward of this bank the vessel enters upon the most dangerous part of this coast, its various sand-banks extending over to South sands, with gaps and narrow channels of mud soundings between them. As the soundings afford no guide in approaching these banks, the depths suddenly decreasing upon them, it is necessary for a vessel intending to pass between the banks to have a boat ahead sounding, and to keep a good look-out from aloft, for the shoal banks can be plainly seen in daytime when the sky is clear.

Between Oujong Perbabean and Oujong Bantan, the north point of Pulo Rupat, the coast forms a deep bight, which is fronted by an extensive sand-bank; this bank, together with those just mentioned, renders this part of the Sumatra side of the strait very intricate and dangerous.

PULO RUPAT.—The north point of this island is called Oujong Bantan, and is in lat. 2° 8′ N., long. 101° 39′ E. It is bold to approach, there being 30 fathoms water within 1½ miles of the shore. Separating Pulo Rupat from the mainland is Salat Rupat, said to be a safe channel for proas. The eastern side of Pulo Rupat is bold until near the entrance of Brewer's strait, where a mud-bank extends from the shore of Pulo Rupat about 5 or 6 miles.

BREWERS STRAIT or Salat Panjang.—The north part of this strait is formed between the mainland of Sumatra and Pulo Bucalisse, and has a general S.W. direction for 20 miles with a breadth of about 5 miles. A shoal mud-bank extends 8 miles to the northward from Tanjong Jati the west point of Pulo Bucalisse. The soundings in the strait vary from 8 to 20 fathoms with the following exceptions: A bank skirts the western shore from Tanjong Muranbung to Boekit village, and 7 miles beyond, extending in some places a mile off shore. Eastward of Tanjong Muranbung commences a narrow ridge of 7 to 15 feet which extends to the south-east 6½ miles. Between this ridge and the shore bank there is a channel 7 to 11 fathoms water one to 2 miles wide. There is a shoal of 10 feet situated 6 miles to the north-west of Boekit and 1¼ miles off shore. Heads of 4¼ fathoms are situated 2 miles to the S.W. and South of Tanjong Jati.

On the west side of Brewers strait, about 8 miles from the entrance, is

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the town of Boekit situated upon the banks of a very narrow river of the same name; the town is not easily perceived, the houses being scattered among and hidden by the trees, but it may be known by a tree, formed like an umbrella, near the entrance of the river.*

Salat Padang.—At Tanjong Ballai, 11 miles to the south-east of Boekit, the strait is 3 or 4 miles in breadth, and opposite to the point is the entrance to Salat Padang, formed between Pulo Bucalisse and Pulo Padang, and affording a safe passage for boats. Near the entrance of the channel there is a shoal ridge having one to 9 feet water.

From Tanjong Ballai, Brewers strait tends in a south direction 10 miles to the mouth of Siak river. Thence the strait extends S.S.E. to the western end of Pulo Rantow, where it contracts to 1½ miles in breadth, with regular soundings of 8 to 10 fathoms.

Salat Ringit.—Between Pulo Rantow and Pulo Padang there is a channel leading to the sea called Salat Ringit, and said to be used only by boats.

From the western end of Pulo Rantow, Brewers strait takes an easterly direction about 25 miles with soundings of 10 or 15 fathoms, till a small island in the middle of the strait is approached; on each side of this island there is a passage, taking care to keep close to either shore of the strait, as a mud-flat extends to the westward from the island 2½ miles into the middle of the strait, and to the eastward about 2 miles into the middle of the strait. Thence the direction of the strait is to the south-east, and after passing three small islands on the port hand the southern entrance opens, off which there are a number of islands. The safest channel out appears to be between Pulo Rantow and Pulo Senappoo, which channel has soundings of 6 feet at low water in some parts.

Tides.—The rise and fall of the tide at the southern entrance of Brewers strait is about 15 feet, with a velocity of 3½ miles an hour, but much greater when nearer the entrance of Campore river. The tides are greatly influenced by this river producing a strong eddy round some of the islands, so that while the tide is running to the southward on one side of an island, it may often be found running to the northward on the other.

Campore river (entrance in lat. 0° 33′ N., long. 103° 6′ E.) is fronted by an extensive mud-flat almost dry at low water. It is little frequented on account of its rapid tides and bore.

SIAK RIVER falls into Brewers strait on the west side. Its entrance is three-quarters of a mile wide and has a sandy spit almost dry at

* Captain M. Quin, R.N., H.M.S. *Raleigh*, who visited Bukit Bato (Boekit) describes it as being built on piles, and as the principal station of the war proas of the Rajah of Siak. The *Raleigh* anchored abreast of the little river in 12¼ fathoms, with the town of Bukit Bato bearing W.S.W. and Tanjong Jati bearing N. by W. ½ W.

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low water, extending nearly across, but leaving a narrow channel close to Tanjong Lyang (the eastern point of entrance). The town of Siak, consisting of wooden huts, is about 65 miles from the mouth of the river.*

In July 1845 H.M.S. *Vixen*, Commander George Giffard, entered this river and proceeded to Siak. On crossing the bar the vessel (drawing 14 feet) shoaled the water to 15 feet, but, on proceeding up, deepened gradually to 12 and 15 fathoms off the town and 6 miles higher up. In entering the river, bring the eastern point of the entrance to bear S. by E. and steer for it on that bearing, keeping the east side of the river on board until above the second island, off which a shoal extends to the eastward; thence the river is clear to the town of Siak.† For vessels of about 200 tons the river Siak is said to be navigable for 20 miles beyond the town of Siak; including boat navigation its navigable course has been estimated at 150 miles.

Tides.—At the mouth of Siak river it is high water, full and change, at 9h.; tides rise 12 feet, and set at the rate of 2½ miles an hour. Off the town of Siak the tide rises 11 feet. It has been stated that the night tides are always higher than the day tides.

CAUTION.—The eastern sides of Pulo Bucalisse, Pulo Padang, Pulo Panjang, Pulo Rantow, and the western sides of Pulo Pappan, or Sabon, should be approached with great caution, as they are fronted by extensive mud-banks, and dangerous sand-banks, in some places having only 9 feet water on them.

STRAITS of SABON and MANDOL are very intricate, and are never used by European navigators. The former is contiguous to the western side of False Durian, Sabon, and Great Carimon islands; that of Mandol is along the Sumatra coast, having part of the coast, the islands of Mandol and Pantjoor, and the entrance of Brewers strait on the western sides, and several islets and reefs on the eastern side which separate it from Sabon strait.

GREAT CARIMON ISLAND is 11 miles long in a N.N.W. and S.S.E. direction; near its north end are two peaked hills, the northern one 1,376 feet high, and the southern 1,474 feet; the rest of the island is low barren land. Its southern end is separated from Sabon island by Glam strait, 2½ miles wide. Near the west side of Great Carimon island are several small low islands. Its east side, as far south as Two-tree point, is fronted by a shoal mud-bank, which extends 1½ miles seaward.

Abreast Two-tree point a bank having a depth of 2¾ to 4½ fathoms extends 6 miles in a S.E. by S. direction: the outer edge of the bank is 2½ miles from the shore of Great Carimon.

* See sketch of entrance of Siak river on Admiralty chart No. 1,355.

† Commander George Giffard, R.N., H.M.S. *Vixen*, 1845.

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LITTLE CARIMON separated from the north-east end of Great Carimon island by a deep channel half a mile wide, is a high bold island 2½ miles long, N.W. and S.E., and rising in two peaks covered with trees, the northern being 1,067 feet high, and the southern 1,026 feet high. There is deep water near the east side of Little Carimon. From its south point a spit extends 4½ miles to the south-eastward, where there is a depth of 5 fathoms. A small islet is situate in the south entrance of the channel between Great and Little Carimon islands.

There is good anchorage to the south-east of Little Carimon island during the south-west monsoon.

The BROTHERS are round islets, the two outermost of which lie near each other about 2½ miles north-westward of Little Carimon, the other of similar appearance is within a mile of that island, and is not so soon discerned as the outer ones. About 2 miles to the southward of the Brothers, and a mile from the nearest part of Great Carimon, is White rock, above water. Seal rock, surrounded by foul ground, is situated about 2½ miles W. ½ N. from White rock.

Westward of the north point of Great Carimon are several small islands, Oxscar, the outer one of which, is 3 miles distant. The ground is foul within a mile of the western side of the northern island. The space southward of the islands, as also the west side of Great Carimon, is but little known.

THE MALAY COAST.

SALANGA or JUNKSEYLON ISLAND, occupied by the Siamese of Ligor, is separated from the Malay peninsula by Papra (or Pak-Prah) strait, and extends between lat. 8° 9′ N. and 7° 46′ N.; it is about 26 miles long and 9 miles broad, and is divided into two Rajahships of about equal size; the northern being called Thalang, and the southern Pu-ket.* The north coast of Papra strait is under the Rajah of Takuatung.

The West coast trends nearly north and south, and has several large bays, with deep water, but none affording any protection against the south-west monsoon. The northern half of this coast is low wooded land, with the exception of one piece of high land at 8 miles from the north point of the island. The southern half is a range of mountains 1,000 to 1,500 feet high, thickly wooded, sloping gradually to the northward and southward, and visible at a distance of 30 miles. This side of the island is steep-to, with 10 and 12 fathoms close to the shore. Off the west coast

* *See* Admiralty chart:—Bay of Bengal, eastern sheet, No. 70*b*; Salanga or Junkseylon No. 842; scale, $m = 0{\cdot}72$ inches.

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are two small islands (Goh Gavai), one 50 feet high, the other low; they lie close together S.W. by W. ½ W. one mile from Lem San in latitude 8° 0′ N. and have deep water around them.

The South coast forms a large bay (Khelong bay) with shallow water, the south-west point of which is called Lem Voalan. At nearly three-quarters of a mile to the southward of this point lies Goh Keo-jai or Pagoda island, on the north-west point of which there are two white pagodas. Between this island and Lem Voalan (Voalan point) there is a safe passage having 8 to 10 fathoms water. To the southward of Goh Keo-jai (Keo-jai island) stands another, Goh Keo-noi, smaller than the former, but of equal height and covered with trees. Besides these two islands there are five others along the south coast of Junkseylon, all high and wooded; with depths of 5 to 10 fathoms round them, except along the north sides of Goh Khalom and Goh Klom. The inner passage round the south coast is deep; it runs between Lem Voalan and Goh Keo-jai, to the southward of Goh Aà and Goh Khalom, and northward of Goh Hee and Goh Bon.

The East coast also trends north and south, and is deeply indented with numerous islands, and has two harbours, namely, Tharuá and Puket or Tonkah. Between the east coast and Pulo Panjang (*Siamese* Goh (Koh) Jao) there is a broad channel in which the flood stream sets to the northward and the ebb stream to the southward, at the rate of 2 to 3 knots an hour.

PAPRA or Pak-Prah strait, as before remarked, separates Salanga from the Malay peninsula, and is about 14 miles long. The natives are very superstitious about this strait, which they have named Pak-Prah or Lord's mouth; the passage is much used by junks. The land on both sides is mostly low and wooded, but the capes or lems are high. Along both shores of the strait are several villages where provisions and water may be obtained.

Outside the western entrance are large sand-banks, with 4 and 5 feet at low water. The passage inward is between the banks, and has 7 to 8 feet at low water. Close to the entrance, which is about half a mile broad, there is a reef of rocks lying along the mainland and only visible at low water; but the reef does not extend very far, and outside the Junkseylon shore is clear with depths of 6 and 7 fathoms near it.

The sand-banks outside the entrance probably shift in the south-west monsoon. At that season the sea breaks entirely across the channel, but in the north-east monsoon the bar is generally smooth.

In September 1875 the channel into Papra strait took first an East course, then a N.E. course, close along the north-west point of Junkseylon for a short distance. The depth on the East course between the two sand-banks

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was 12 feet at low water, and further in, on the N.E. course, the depth was 7 to 8 feet only, at low-water spring tides. Inside the bar there is good anchorage in 5 or 6 fathoms.

From the west entrance of Papra strait to Lem Khoen, there is a good channel with 4, 5, and 6 fathoms at low water.

The narrowest part of Papra strait is between two points, Lem Hin on the continent and Lem Khoen on Junkseylon 4½ miles from the west entrance, to the eastward of which there is a sand-bank dry at low water, and to the southward of this bank there are only 9 feet at low water, whilst 4 and 5 fathoms are to be found on the north, west, and east sides of the bank. Another large sand-bank extends from the west side of Lem Asam, between which bank and the aforesaid bank lies the channel.

Between the dry sand-bank situated in the middle of the strait and Goh Galah, a small white rocky island situated 1½ miles to the south-east of Lem Khoen, there is a broad channel with 4 and 5 fathoms water. Goh Janak is a small island lying a quarter of a mile to the south-west of Goh Galah. To the south-west of Goh Janak there are extensive sand-banks dry at low water, and to the south is Tamaprau river, on the banks of which at 2 miles from the mouth the town of the same name stands, and again 1½ miles further is another larger town, Muang Mai, but boats cannot go beyond Tamaprau.

To the eastward of Goh Janak and Goh Galah there is good anchorage in 4 or 5 fathoms.

Pass on the north-east side of Gah Galah at 2 cables distant, and then steer S.E. to pass Lem Sai (on Junkseylon) one or 1½ cables distant; in this part there are soundings of 4 and 5 fathoms. Thence steer E. by S. ¼ S. to pass about 2 cables north of Goh Rangam Jai or Passage island of old English navigators, a round island, like all the rest in this locality, covered with trees; between these two places the channel, which is formed between the fringing sand-banks, is little more than a cable wide, has 12 feet at low-water springs, and is composed of soft mud. From Passage island steer E. ¼ S. to pass about 3 or 4 cables southward of Goh Rangam Noi, the water gradually deepening as the latter is approached. Then steer East passing Lam Lem or cape Three points the north-east point of Junkseylon at 3 or 4 cables distant, and with 7 fathoms water. Thence E. ½ N. to pass 5 cables south of Goh Leng and 3 cables north of Goh Thanan or Pulo Choopa, a small round island 2 miles east of Lam Lem. Pass eastward of Goh Thanan a mile distant, and then, if bound to Tharúa harbour, steer between Goh Ret and Goh Naka Jai in a channel having 6 fathoms water.

Tides.—The tides in Papra strait are very irregular. At the bar the times of high and low water seem to correspond nearly with those at

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Pu-ket; but inside the strait the tidal streams of flood and ebb run respectively one to 2 hours after the water has commenced falling or rising At the west entrance of the strait the tidal stream sometimes runs at the rate of 6 knots, but to the eastward it generally attains only half that velocity.

At the west entrance, in September 1875, there seemed to be two tidal streams, one at the surface, and another counter-current at the bottom of about equal velocity; the water was bubbling and full of whirlpools, and it was found impossible to make a stake stand in the ground for more than a few minutes.

The East Coast.—Goh Naka Noi, a narrow island three-quarters of a mile long north and south, is surrounded by groups of rocks. Eight cables to the south-west of Goh Naka Noi is Goh Peh, a small island from which reefs extend on all sides. Between the last two mentioned islands and Junkseylon there is a good channel, with 4 and 5 fathoms water.

Klang Bangkrong, westward of Goh Naka Noi, is a large river leading to the old residence of the Rajah of Thalang, who lives now at Bandon, a place on the west coast of Junkseylon, up a river which lies to the east of Goh Gavai.

Tharúa harbour (ship's harbour), is about 7 miles southward of Lam Lem. The town of Tharúa, situated 1½ miles up a small river, was formerly the residence of the Rajah of Pu-ket, but in 1859 he removed to Pu-ket; nothing is now exported from, or imported into Tharúa. The harbour is bounded on the south by a large island named Maprau, and to the eastward by two islands, Goh Alang Jai, and Goh Alang Noi. There are two entrances, the better one being to the northward of Alang Noi; the other to southward of Alang Jai, and passing to the northward of Goh Mali, and Goh Cap. The bottom is mud, shoaling gradually from 8 fathoms northward of Alang Noi to low-water mark on the side of the river. The anchorage is in 3 fathoms, with Alang Noi bearing E. by N. and the middle of Goh Maprau South.

There appears to be a shoal about half a mile westward of Goh Alang Jai.

Goh Lipe (Pulo Cappal of old navigators), is a conical rock more than 100 feet high, and bold, about 5 or 6 miles to the eastward of Goh Alang Jai; but its position has not been accurately determined.

Pulo Cirie, an island only separated from the shore by a narrow creek, which at low water is impassable even for boats, forms the north-east extreme of Pu-ket harbour; its south-east point is named Lem Atpha.

Pu-ket harbour (generally known as Tonkah), the southernmost of the several large bays on this coast, is 4 miles from the south-east point.

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Pu-ket is the principal place in Junkseylon, and the residence of the Rajah; it is the only port frequented by coasting steam vessels. The only export is tin, of which about 100,000 pikuls* leave Pu-ket every year. The harbour master's office is in latitude 7° 51′ N. and longitude 98° 24′ E. (approximate).†

Directions.—Lem Phan-Va, the south-east point of Junkseylon, is steep-to; a shoal on which stands a group of rocks awash at high water extends from the point nearly one mile to the south-west. Vessels proceeding to Pu-ket, when off this point should steer N.E. until Tonkah hill is seen bearing N.N.W. between two islands, the eastern of which is called by navigators Antelope island, but by the natives of Siam, Goh Tapaunoi; and by Malays, Pulo Kapal Kechil. The other is Goh Tapau-jai, or Pulo Kapal Basar.

A course N.N.W. leads between these islands into the harbour. The harbour is divided into two anchorages by a sandy flat, over which there is only from 6 to 9 feet at low-water spring tides, therefore, only small vessels can go into the inner harbour. Large vessels should anchor in 3½ or 4½ fathoms (low water), about 2 or 3 cables to southward of the black buoy which marks the south side of the sandy flat. A red buoy marks the north side of the flat, and small vessels may anchor in 2½ fathoms at low water about 2 cables to the northward of this buoy. The channel between the two Pulo Kapals has 4 and 4½ fathoms at low water. After passing between the islands, steer N. by W. if intending to anchor in the outer harbour. If bound to the inner harbour steer to pass close to the westward of the black buoy, and to the eastward of the red buoy.

Vessels from the eastward may enter the harbour by passing to the northward of Pulo Kapal Kechil, and to the north of a red buoy which marks a coral reef extending one cable from the north end of the island. Between Pulo Kapal Kechil and Lem Atpha (the north-east point of the harbour), there is a sand-bank having only 6 or 7 feet at low-water spring tides. From the south side of Pulo Kapal Busar a rocky reef, with a small islet and sand-banks, extends to a distance of one mile southward.

The bottom, at both inner and outer anchorages, is mud. The harbour is open to east, and south-east winds, during the prevalence of which there is a little swell.

Town.—The town of Pu-ket lies about one mile up a small creek. At high water boats can ascend to the town, but at low water they can only go to a stone pier by the harbour master's office, from which a road leads to the town.

Tides.—It is high water, full and change, in Pu-ket harbour at

* A pikul is equal to 133 lbs. English.

† *See* Admiralty chart: Puket harbour, No. 843; scale, $m=2$ inches.

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10h. 10m., springs rise 9 feet, neaps 7 feet; during the south-west monsoon the day tides are higher than the night tides. In the north-east monsoon the night tides and the day tides are equal. Very little tidal stream is felt in the harbour.

Winds and Weather.—Pu-ket harbour:—*January.*—Steady north-east monsoon; wind generally more to the E.N.E. and sometimes East. The wind is generally stronger in the evening and night than in the daytime. Temperature between 60° and 80°. No rain.

February.—Steady north-east monsoon the first half of the month with no rain, and generally blowing fresh. In the latter part of the month the north-east monsoon becomes weaker and is squally every three or four days, generally in the evening and from the northward. Temperature between 75° and 85°.

In this month fresh water is very scarce, there is also much fever and other sickness amongst the natives.

March.—North-east monsoon very weak, generally from North, and sometimes N.W. with occasional squalls from the N.E. Temperature between 75° and 90°. Great scarcity of water and much sickness on shore.

April.—Change of monsoon, winds from West to North; heavy squalls from the north-eastward generally occur with high water in the afternoon or evening. The temperature is between 70° and 80°. The night tides are very low. There is much sickness.

May.—The burst of the south-west monsoon occurs in the first week of May, after which the wind seldom blows from the east quarter. The heavy rains now commence, and squalls are frequent. On the west shore of Junkseylon the swell is heavy, but Pu-ket harbour is well sheltered.

June.—South-west monsoon fairly set in, with heavy squalls from the S.W. and N.W. When rainy weather sets in it usually lasts for five days, after that there is generally fine weather (without rain) for about a week, and sometimes for a fortnight. The heaviest squalls come with high water, afternoon and evening. Temperature between 60° and 80°. Day tides higher than night tides.

July.—South-west monsoon, with squalls and heavy showers; generally the weather is rainy for five days and then fine again for five days. When the wind is due S.W., there is rain; when West and N.W., fine weather. Mean temperature 80°. Day tides higher than night tides.

August.—Strong south-west monsoon the entire month, with squalls and heavy rain, much the same as July, but in August the rain sometimes continues for ten and even fifteen days, and is usually followed by the same period of fine weather. Heaviest squalls generally at night-time. Mean temperature 82°. This is the hottest month, and the greatest rainfall occurs, the average number of rainy days being from eighteen to twenty.

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September.—Strong south-west monsoon, but the wind more from westward. Fewer squalls, but heavier and longer showers of rain than in August. Mean temperature 80°. Rainy days about eighteen. Fine weather generally lasts but one or two days at a time.

October.—During the first half of month south-west monsoon is steady; towards end of the month the wind is very unsteady; Westerly and S.W. still prevailing. Showers not so heavy as in September. Rainy days about fourteen. Weather cloudy. Mean temperature 80°. Day tides still higher than night tides.

November.—Weather very variable. West and S.W. winds still prevailing, but often veering to the northward and eastward; heavy squalls from all quarters, but heaviest from S.W. Rainy days fourteen. Weather very cloudy the whole month, generally three or four days fine at a time. Mean temperature 80°. Day tides still highest.

December.—North-east monsoon setting in strong and with heavy squalls from N.E., wind generally to the eastward of N.E.; sometimes heavy squalls from the north-west accompanied with lightning. Average number of rainy days six or eight. Mean temperature 80°. Towards the end of this month mostly clear weather. Day tides and night tides of equal height.

GOH (KOH) JAO (or PULO PANJANG) is a large island to the eastward of Junkseylon and belongs to the Rajah of Panga. Along the west coast, which trends nearly north and south, there are several high rocky islands steep-to, and the channel between these islands and Junkseylon is broad with 10 fathoms water. The south coast forms a bay, off the centre of which at 2 miles distance there is a small island with reefs extending from it. Depths of 16 fathoms are found at 4 miles off this coast. N.E. by E. from the south point, and at 3 or 4 miles from the coast, lies a group of rocks, of which, at high water, only one small part is above water, about 2 feet. There is a depth of 10 to 14 fathoms water around these rocks, at a distance of one mile.

Goh Jao is not, as formerly shown on the charts, one, but consists of three large islands, separated from each other by a channel one half to 2 miles in breadth. These three islands are named Goh Jao Jai (the southern), Goh Jao Noi (the north-east), and Goh Boi (the north-west); they are mostly high, and covered with trees. The channel between them runs N.W. and S.E. and has from 1½ to 3 fathoms water. The east coasts of Goh Jao Jai and Goh Jao Noi lie nearly in a line and almost straight north and south. At the middle of this line the channel between the islands has its entrance. To the southward of this entrance stands a high bold island, Goh Ray Nok (Bird's Nest island), and to the northward there are two small islands at half a mile from the land. Between these islands

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there is a sand-bank, but at one mile to the eastward of them are depths of 6 or 7 fathoms. To the northward of the island the coast is steep-to, and has depths of from 9 to 10 fathoms water within one mile from the coast.

To the eastward of Goh Jao Noi, there stands an extensive group of islands, all high and bold, and almost without exception steep-to. Between these islands and Goh Jao Noi there is a safe channel, with 10 and 12 fathoms water. To the northward of Goh Jao Noi, there stands a high square island which can be passed on both sides, but the channel to the northward is the broader and the one generally used; in it the depth is 7 fathoms. To the northward of this island, lies a group of islands called Goh Fai Mai; and again to the westward of them is a good channel with from 7 to 10 fathoms water; between them and three other islands about 12 miles off, this channel runs nearly N.W. by N. and is the usual common passage to Goh Mak.

Goh Mak is a low, wooded island, about 1½ miles long and three-quarters of a mile broad; in latitude 8° 16′ N. It is surrounded on the north, west, and south sides by extensive sand-banks, but has deep water on the east side, where vessels may anchor within a cable or two from the island in 6 to 10 fathoms. The Rajah of Panga has a house here, and good water is plentiful. The whole space between Goh Mak, Goh Jao Noi, and Goh Boi is full of sand-banks and rocks, parts of which are visible only at low water. From the northern point of Goh Bantang (an island to the northward of Goh Boi) there is a channel to the eastward in which the depth is 1¾ fathoms at low-water springs.

In the bay to the northward of Goh Jao, besides many small, there are three tolerably large rivers,—the Takua-lung, the Panga, and the Paklan rivers.

TAKUA-LUNG RIVER may be approached from the southward to within 2 miles of its mouth, by passing between several islands; Goh Boi and Goh Bantang on the one side; and, on the other side, an extensive group of very high bold islands lying along the coast of the mainlaind. The largest of these islands, Goh Tjanak, is about 1½ miles long, very high, and lying to the westward of Goh Bantang. From 10 fathoms the water shoals gradually towards the mouth of the river, and vessels may anchor in 3 to 4 fathoms at 2 miles from the mouth. Both outside and in the mouth of the river are large sand-banks, between which there is a channel with 2 to 3 fathoms water. Inside the mouth of the river for a short distance, are depths of 3 or 4 fathoms. At 4 miles up the river is the town of Bosam where the Rajah of Takua-lung resides. A large quantity of tin is exported from this place.

PANGA RIVER.—Panga town, the residence of the Rajah, lies 6 or 7 miles up this river in latitude 8° 26′ N. Depths of 3 to 4 fathoms

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are found in the mouth, but the river further up is very shallow. Outside the mouth there are large sand-banks between which a channel, with 5 feet at low water, and 12 or 13 feet at high water, leads into the deep water to the eastward of Goh Mak. A considerable quantity of tin is exported from Panga.

Paklan river.—Between Paklan river and Goh Mak there is a good channel with deep water. Outside the river there is a bar with 2 fathoms at low water in the deepest place, but inside there are depths of 5, 4, and 3 fathoms for a considerable distance. Ban Paklan, the Rajah of Paklan's residence, is situated 6 miles up Paklan river.

LAKAN ISLAND.—The west coast of Lakan from Lem Sak to Goh Sibong trends in a south-eastern direction. The coast is mostly low, wooded land, with a great many creeks, rivers, and large and small bays. Along the whole coast there lie a great many islands.

Lem Sak lies 3 miles to the northward of Goh Jao Noi and is high, bold land. Between this point and Lem Derry (*Malay* Toma mare) is a large, but shallow, bay. Lem Derry is also high, and thence the coast trends in a southerly direction for 10 miles to a point named Lem Nakarath. Between Lem Derry and Lem Nakarath there is a channel with 7 to 8 fathoms. Off this coast are a great number of high, bold islands, with deep water around them, on which the natives collect edible birds' nests. To the southward and south-eastward of Lem Nakarath lies a group of small islands, the largest of which are Goh Damgoa and Goh Damhak, both high and bold.

To the southward of Lem Nakarath the coast forms a large bay, Kos-bee bay, and Kos-bee river is the middle one of three in the north part of the bay. To the south-east of Kos-bee river is Pakasai, another large river, in the mouth of which are depths of 4 or 5 fathoms, but there are large sand-banks outside. A channel, with 2 fathoms of water, runs from the mouth of the river straight to the westward.

Lem Luang is the north-west point of a large island of the same name, situated 12 miles S.E. by S. of Lem Nakarath. To the westward of Lem Laung there is deep water, 10 to 20 fathoms, but to the north and southward there are sand-banks. Between Goh Luang and Goh Papidan there are said to be some rocks just covered at low-water spring tides.

Pulo Rajah or Pulo Saya is a small island in lat. 7° 36′ N.

The BROTHERS lie 5 miles south of Pulo Rajah, they are two in number, small, but moderately high, with an islet near them. Between these islands and others contiguous to the south end of Salanga the channel is safe, and has from 20 to 35 fathoms; it may be adopted by vessels approaching from the eastward, but the main channel for those bound into Terrua bay is on the east side of Pulo Rajah and the Brothers.

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VOGELS ISLANDS.—The Vogels are a group of islands lying to the south-west of Lem Luang. The group consists of one large, and five small islands. To the northward of the large island are two small islands, Goh Jung and Goh Mapai, and to the southward a long high island, Goh Pepithale ; besides these there are two small islands.

Goh Pepidan, the largest of the Vogels, is a high, wooded island, 4 miles long, 2 miles broad, and steep close to the west side, the south end of which is highest and forms a deep bay with 6 to 7 fathoms close in shore. Extending about half a mile from the south-east point there is a reef surrounded by a large sand-bank; this reef is always visible. Between Goh Pepidan and Goh Pepithale there is a channel with 10 to 12 fathoms water. At 7 miles to the southward of Goh Pepidan there lies a small round island, Goh Ma (Dog island) ; and one to 4 miles W.N.W. from this island there are two large groups of rocks covered at high water.

PILGRIMS, or GOH HA, are a group of five islands lying 13 miles S. by E. from Goh Ma ; they are all small, whitish-looking islands, bold and steep-to, having from 20 to 24 fathoms within one mile of them. They are not visible at night as clearly as the other islands along this coast on account of their white colour. The largest of the Pilgrims is called Goh Há-jan.

Goh Ladujang is a large square island to the east and south-east of Goh Luang, being separated from the latter and the mainland by a channel, one to 2 miles broad, with one, 2, and 3 fathoms of water. Goh Ladujang is mostly low land, covered with jungle, with but few inhabitants.

KLAT DOJANG—Goh Tingsing, to the sonthward of Goh Ladujang, is separated from it by a channel nearly one mile broad (Klat Dojang) in which there are depths of 3 to 4 fathoms.

In the eastern entrance to this channel lies a group of islands, the largest of which is Goh Krapu, high and steep-to ; the deepest channel runs close along the west side of the island, then round the north point between it and a small island to the north; and then, close along the east side of Goh Krapu ; this channel has 2 to 4 fathoms at low water.

At the west entrance of Klat Dojang channel lies an extensive sand-bank, partly dry, on the south side of which there is a passage out to sea with 1½ or 2 fathoms at low water. Goh Tingsing is higher than Goh Ladujang and also closely wooded.

PULO LANTAR is a large high island to the southward of Goh Tingsing, and only separated from it by a narrow creek running in a north-west direction, but with very little water. The west sides of these three islands extend in a line nearly north and south. From seaward they

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appear as one island, the creek just described not being visible, and the sand-banks in the entrance of Klat Dojang filling up the whole entrance of the channel. On the west coast Pulo Lantar is very steep-to, and between this island and the before-mentioned outlying groups of islands (Vogels and Pilgrims) there is a channel with 16 to 24 fathoms.

Along the east sides of Pulo Lantar and Goh Tingsing is a row of islands, all small, high, and wooded. To the south-east of Goh Rekam, the middle island of the group, lies a rock about one mile distant, which is always visible, looking like two square sails standing out of the water. Between these islands and the sand-banks extending from the mainland, is a channel with soundings shoaling gradually from 8 fathoms at the south point of Pulo Lantar, to 3 fathoms to the eastward of Klat Dojang.

Goh Khai, Goh Ganja, and Goh Libsig, with several other small islands form a group to the eastward of Pulo Lantar, and close to the mainland. To the south-east of Lantar lies a group of islands, the largest of which are Goh Ngai, Goh Muk, and Goh Kadau.

Goh Ngai is a long and high island with soundings of 10 fathoms within a mile of it; reefs extend from its north and south points, but only to a short distance.

Goh Muk is a square high island to the south-east of Goh Ngai, and its eastern side has a low and sandy shore. From the mainland opposite large sand-banks extend, and between these and Goh Muk, close to this island, is a channel having, in the shallowest part, $1\frac{3}{4}$ fathoms at low-water spring tides.

Goh Ma (Horse island), Goh Kram, and Goh Kleing are small high islands between Goh Ngai and Goh Muk.

Goh Kadau is a long, narrow, and high island to the southward of Goh Ma surrounded by deep water. Between Goh Ngai and Goh Kadau there is a good channel with 7 to 10 fathoms.

GOH LIBONG is a large triangular island about 20 miles to the south-eastward of Pulo Lantar. The west and south sides of Libong are high, but the north and east sides very low. To the northward it is separated from the mainland by a channel one or 2 miles broad. In the western half of this channel there is a passage with 3, 4, and 5 fathoms by keeping to the Libong side; but in the eastern half the passage is narrow and runs between large sand-banks; the deepest water, namely, 2 to 3 fathoms, runs close along the Libong side. When the north-east point of Libong is passed, the passage runs nearly E. by N. between two large sand-banks, the one extending from the north-east point of Libong, the other from a small island which lies $1\frac{1}{2}$ miles to the north-east of Goh Nak; these banks are both dry at low-water spring tides, and the depth in the channel is then $1\frac{3}{4}$ fathoms.

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Goh Kung, a small rocky island off the west coast of Goh Libong, is connected with that island by a reef, which dries at low water.

Between Goh Muk and the north-west point of Goh Libong lies an extensive flat of sand extending from the mainland. Between the north-west point of Libong and Goh Muk there are depths of 3 fathoms at low water. Between the bearings of W.S.W. and W.N.W., from the south point of Goh Libong, and from 3 to 5 miles off, there lies a group of rocks said to be dry, or visible at low-water spring tides, and to have deep water around. Several junks have been lost here lately.

ROCKS.—Other groups of rocks are said to lie between Goh Libong and Goh Kadau; and at low-water springs, if there be a little swell, a needle-shaped rock is said to be visible, lying due West from the middle of Libong and 5 miles distant. When coming from the northward, the safest way is to steer in between Ngai and Kadau, for the north-west point of Goh Libong; and when at 1½ miles distant from that point in 4 fathoms of water, steer South :—this will take a vessel along the west coast of Libong in 7 fathoms. When past Goh Kung, steer round the south point of Libong keeping in 7 fathoms about one mile off shore.

On the mainland, abreast the east coast of Goh Libong, there is a large bay, into which two tolerably-sized rivers flow; this bay is almost filled with rocks and sand-banks, of which the greater part are visible at low water. The channel into Trang river extends from the south point of Goh Libong in a north-north-east direction, along the coast of Libong, and between a large sand-flat extending off this island and a large group of rocks and sand-banks in the bay; in this channel there are depths of 2 to 5 fathoms at low water. With Goh Muk bearing west, distant one mile, vessels may anchor in 3 fathoms at low water, sandy bottom.

TRANG RIVER debouches in the north part of this bay and has two entrances; the eastern one is broad and shallow, the western entrance is narrower, but deeper. From the anchorage off Goh Muk, the channel lies between sand-banks in a N. by W. direction, and has from 1½ to 3 fathoms at low water. On the west side of the river-mouth there is a small fishing village, where good river pilots may be obtained. Trang river runs up in a general north and south direction, and is said to extend upwards of 50 miles inland; it is narrow and has from 1½ to 3 or 4 fathoms at low-water spring tides.

Trang town, where the Governor resides, is 13 miles up the river, and as far as that place, the river was ascended by His Siamese Majesty's Ship *Regent* in September 1875, drawing 10½ feet. At 3 miles above Trang town is the Chinese town of Kintain, to which vessels drawing 12 feet easily go. Large Chinese junks go up there, and strange to

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say, a large Europe-built ship was lying there, most likely a Dutch East Indiaman.*

PULO TELIBON.—Supplies may be obtained at Pulo Telibon which lies close to the shore in lat. 7° 14′ N., and where vessels may anchor in 4 or 5 fathoms in a small harbour on the western side; care is required in entering the harbour.

From Telibon a chain of high rocky islands extends along the coast to the nort end of Pulo Trotto; there is a good passage of 8 to 10 fathoms water on the outside.

QUEDA RIVER.—The entrance of this river is in lat. 6° 6′ N., and at low water has a depth of 3 feet on its bar; there are fishing stakes on either side of the entrance, and a remarkable clump of trees is situated on the right bank. Vessels drawing 8 feet, and having a pilot, can proceed up to the river to the town of Queda, which is 7 miles from the sea: but it is necessary to moor head and stern there. Inside the bar the depths vary from 2 to 5 fathoms.† Provisions may be obtained at Queda.‡

There is anchorage in 5 or 6 fathoms 3 miles off the mouth of Queda river, with the entrance bearing E. by N. and Boonting island S.S.E., thence the soundings shoal gradually to the sea.

Tides.—It is high water, full and change, at 12h.; rise 9 feet.†

Elephant mountain, 780 feet high, is situated near the shore in lat. 6° 11′ N., and is an isolated and remarkable object. It is well named, as it has the appearance of an elephant kneeling, with its head to the southward. There is also a hill to the northward of the Elephant, but not so high, nor has it any remarkable appearance.

Rivers.—There are several rivers between Salanga island and Queda river. Phoonga, to the S.S.E. of Salanga, is a river of some importance, where the Siamese build their proas and boats; the town is a considerable distance up the river. Parlis river entrance is 20 miles to the northward of Queda river; coasting vessels anchor off there in 3 fathoms to the south-west of a group of four islands named Pulo Panjang, Pulo Kuniet, Pulo Korap, Pulo Brasmana, which lie near the main on a mud-flat, and with a haycock-shaped mount bearing N.N.E.; the mud-bank lining the coast here is very flat.

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* The preceding remarks on Junkseylon and neighbouring islands, commencing at page 31, are by Commander A. de Richelieu, of the Siamese Gunboat *Coronation*, 1876.

† Commander J. F. G. Grant, H.M.S. *Midge*, 1873.

‡ The province of Queda is bounded on the north by the Siamese territory of Ligor, to the east by the Malay state of Patani, and to the south by the state of Perak. The island of Penang formerly belonged to the state of Queda.—Crawfurd's *Descriptive Dictionary of the Indian Islands and adjacent Countries*. London, 1856.

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SANGALD or GUILDER ROCKS, in lat 7° 10′ N., 15 miles south of the Pilgrims, and the same distance W. by S. ½ S. from Pulo Mohea, is a reef elevated 2 or 3 feet above water; it is steep, having 30 to 40 fathoms close-to. These rocks are said to be visible only during the north-east or dry monsoon, consequently great care is required in approaching them.

DIRECTIONS.—Having approached Pulo Mohea, pass it on the west side at 4 or 5 miles distant, by which a berth of 9 miles will be given to Sangald rocks, lying to the westward. From Pulo Mohea steer about S.E. by E. for Edam, which is the easternmost of three small islands of moderate height, situated nearly midway between Pulo Buton and Trotto. In passing between Trotto and Edam islands keep closer to the latter to avoid Black rock, which is awash at low water, and lies 4 or 5 miles off the north-west side of Trotto. There is also a dangerous reef on which the sea breaks fronting the south-east end of Buton island; there is a passage having 16 fathoms water between the reef and Edam islands, which passage may be used if necessary. From Edam steer south-easterly for the south-west end of Pulo Laddas, which, if the wind be northerly or north-easterly, pass in 16 fathoms; then steer E.S.E. for Boonting islands.

A small vessel bound to Queda may pass inside the large islands of Trotto, Lancava, and Ladda, between the islands and the mainland; soundings of 4 or 5 fathoms will be found near the coast, and 8 to 10 fathoms nearest the island; the shore of the mainland is skirted by a shoal mud-bank, which extends a considerable distance towards the islands. Thence she may steer in 5 or 6 fathoms near the coast to Queda river.

Between Telibon and Pappan there are some dangerous rocks, covered at high water.

Little passage is preferable to the last-mentioned one, inside the principal island. After rounding the Brothers at 3 or 4 miles distant, steer East and E. by S. for Pulo Mohea, which course will lead outside the Pilgrims, and about 8 or 9 miles to the eastward of Sangald rocks, but care must be taken to guard against the current.

LANCAVA ISLANDS, consisting of a group of three large islands and many smaller ones, extend north-west and south-east, and are high, bold islands, particularly Lancava, the central one, which has a peaked hill (Gumong Raya) 2,952 feet in elevation. There is also to the south-east a peaked hill resembling the former, which is generally called Ladda peak. Within 2 miles of these islands there are irregular soundings of 8 to 16 fathoms water. At a distance of 10 or 12 miles westward of the islands the depths are 24 to 30 fathoms. The shore of the mainland

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adjacent is fronted by a mud-bank, which extends from 5 to 10 miles off the coast.*

Currents.—In the offing the currents generally set to the northward during the south-west monsoon, and to the southward during the north-east monsoon.

Tides.—Amongst the islands and in the channel between the islands and the shore a tidal influence prevails. It is high water, full and change, at 12h.; rise 12 feet.

Trotto, the northernmost large island of the group, has a cove or small harbour at its north-east end; the channel which separates this island from Lancava has 8 to 14 fathoms. Near the south-east point of Trotto there is situated an islet and a small rock. A high pyramidal rock, having 15 fathoms close-to, lies at about one third the distance from the south-east point of Trotto to Lancava.

Pulo Buton is formed of two large and high islands very near each other, with some islets adjacent and a reef of rocks off their south-east extremity. The eastern of the two large islands is formed of a regular sloping pyramidal mountain called Buton Dome (lat. 6° 33′ N.), which may be seen from a distance of 50 miles. The soundings close to Pulo Buton are 17 to 26 fathoms.

Laddas islands, which form the south and east parts of the group, are high, rugged islands of barren aspect.

BASS HARBOUR.—Between the two largest Laddas islands, namely Pulo Laddas and Pulo Tubah, Bass harbour is formed. The channel leading to it from the north-west is along the south-west end of Lancava island, where the depths are from 7 to 12 fathoms, and there are from 4 to 10 fathoms water in the channel leading into the harbour from the southward. The south part of Lancava island, about 3 or 4 miles to the northward of Bass harbour, is partly cleared and inhabited by Malays and Chinese, but there being no trade at these islands the harbour is not frequented.

Caution.—Strangers landing on any of the Lancava islands ought to be cautious if they penetrate inland, for the snakes here are very large. These islands are also a rendezvous for pirates, who are on the look-out to attack trading proas or small trading vessels. They have sometimes been known to lurk about the entrance of Penang harbour.

Pulo Seguntung or Rat island, a high rock, lies S.E. 10 miles from the south extreme of Pulo Tubah, and is in lat. 6° 3′ N., long. 99° 54′ E.

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* *See* Admiralty charts: Sumatra, west coast, sheet 1, No. 2,760; Malacca strait, Bass harbour to Parcelar hill No. 793*a*.

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There are 17 and 18 fathoms close to its north and east sides, and 19 fathoms 2 miles to the south-west of it.

Pulo Payer, lying 6 miles E. ¾ N. from Pulo Seguntung, is high, about a mile long N.E. and S.W., and 3 cables broad: it is steep-to, with the exception of part of the north-east side. A mile S.W. of the south-west point of the island there is a 5-fathoms patch. A mile from the north-west side of the island there is another patch of 5 fathoms.

Pulo Lambu, separated from the north-east end of Pulo Payer by a channel half a mile wide, is about a quarter of a mile in extent, high, and foul on its north side to the extent of 2 cables. In the channel, and about a quarter of a mile from the west end of Pulo Lambu, is Pulo Katcha, a small rock about 3 feet high. The entrance of Queda river bears E. by N. distant 14 miles from Pulo Lambu.

Near the islands of Pulo Payer and Pulo Lambu there are, with the exceptions mentioned, soundings of 13 to 16 fathoms within half a mile of the islands. Soundings of 10 to 14 fathoms will be found until within 5 miles of the entrance of Queda river.

PULO PERA, or Silver island (lat. 5° 42′ N., 98° 56′ E.), is a peaked, barren, white rock, 394 feet high, entirely devoid of trees, and the resort of numerous sea birds ;* it lies nearly midway between Diamond point and Queda river (Malay coast). The island is steep-to, there being 40 or 50 fathoms water very near it, 40 to 60 fathoms within a distance of 5 or 6 miles, and no bottom at 60 or 70 fathoms 18 or 20 miles to the westward.

Pulo Pera is often taken as a point of departure, and when the weather is cloudy during the south-west monsoon it is not unfrequently the first land seen after entering Malacca strait. Sailing vessels should then give it a wide berth, for at that time calms and light airs are likely to prevail in its neighbourhood, during which vessels have been carried by the current towards it, and have been obliged to anchor in deep water to prevent being driven against the steep rock.

BOONTING ISLANDS consist of Pulo Boonting (lat. 5° 53′ N., long. 100° 19′ E.), Pulo Songson, Pulo Tolo, and Pulo Beedam ; the whole of these islands are barren. A depth of 12 fathoms will be found 3 miles seaward of them. Pulo Boonting is 610 feet high, 1¼ miles long in an E.N.E. and W.S.W. direction, half a mile wide at its broadest part, and separated from the mainland by a channel a mile wide, and which has 6 to 9 feet water. A rock awash is situated 2½ miles to the northward of Pulo Boonting, and 1½ miles from the shore.

Pulo Songson, lying 4 miles S. by W. ¾ W. from Pulo Boonting,

* Navigating Lieutenant F. J. Gray, R.N., H.M.S. *Nassau*, 1872.

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and 4¼ miles from the mainland, is almost circular, about a quarter of a mile in diameter. Between Pulo Songson and Pulo Boonting the soundings are from 4 to 7 fathoms. There is deep water on the eastern side of the island,* but the remaining sides are skirted by a reef which extends a cable to seaward. A mile S.W. ½ W. from Pulo Songson are Songson rocks, 25 feet high, and occupying a circular space of a quarter of a mile in diameter. There are from 8 to 10 fathoms close to the rocks.

Pulo Tolo lies S. by W. 2¼ miles distant from Pulo Songson, and is skirted by a reef. Regular soundings of 7¼ fathoms are found between the two islands, and the water shoals gradually towards the shore from 6 fathoms near Pulo Tolo to 3 fathoms, the latter depth being found at 1½ miles from the shore.

Pulo Beedam lies a mile south of Pulo Tolo, and is two thirds of a mile long in a N.N.W. and S.S.E. direction by a quarter of a mile broad. The island is almost encircled by a reef, and has from 4 to 6 fathoms within half a mile of its shores.

The COAST from Queda river extends in a S. by E. direction 25 miles to the entrance of Marbu river; from Queda the coast continues low and woody till within 8 or 9 miles of Marbu river, where Gunong Jurrai or Queda peak is situated at a distance of 4 miles from the coast. In lat. 5° 56′ ½ N. and 7 miles from the coast is situated Bukib Choreh or False Elephant hill; the head of the animal it represents is situated to the westward and the hump to the eastward. Southward of Marbu river, as far as the north entrance to Penang, the coast continues low.

A mud-flat skirts the shore between Queda and Marbu rivers, on which flat will be found a depth of 18 feet at one to 2 miles from the shore, except abreast of Pulo Beedam and Marbu river, where the edge of the bank is 4½ miles from the shore. The edge of the bank then gradually approaches the shore till abreast the north end of Pulo Penang, where it is a mile distant from the shore.

Marbu river.—The entrance of this river, formed between the low coast on the north and Marbu hills on the south, is almost closed by a mud-flat which has 4 to 6 feet water, and extends nearly 3 miles to seaward. Off the south side of the entrance is situated the small island of Pulo Sayer.

The coast thence, as far as the locality of Penang, is low and skirted by a bank which extends 3 miles to seaward, and has from 12 to 18 feet water. In this tract of coast several small rivers, of which Muda is the chief, discharge into the sea.

Caution.—In passing between Queda river and Penang during the

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* Between Boonting and Songson islands there is a small rocky islet.—Navigating Sub-Lieutenant G. F. Whitmore, H.M.S. *Midge*, 1873.

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night care must be taken to keep clear of the numerous fishing stakes which are moored some 6 or 7 miles from the land.*

PULO PENANG, or Prince of Wales island, a British settlement lying between the parallels of 5° 28′ N. and 5° 15′ N., is nearly 14 miles long in a north and south direction, by 8 miles broad, and has an area of 164 square miles; it is separated from the mainland by a strait 1½ to 7 miles broad.† On the opposite shore of the mainland Province Wellesley, a strip of territory about 25 miles long, and averaging 8 miles in width, also forms part of the settlement; this territory is situated between Muda river and Kreean river.

The north part of the island is mountainous, and through the centre of the island runs a range of hills, declining in height as it approaches the south-west extremity, but two-thirds of the whole surface of Penang are level and of gentle inclination, and, like the hills, are covered with woods. West hill, the highest point of the island, is 2,735 feet high; at a short distance to the eastward is Government hill, on which stands a signal flagstaff 2,550 feet above the sea. The western side of the island is low and wooded. The climate of the high lands is said to resemble that of Funchal in Madeira; the thermometer in the plains ranges between 76° and 90°, and on the mountains 64° to 76°. Rain falls throughout the year. Excepting in a few places, Penang is considered to be very healthy. The island produces much timber, which is well adapted for shipbuilding and masts; also fine fruits. The soil is favourable to the growth of spices; the chief cultivation is in sugar, rice, and cocoa-nuts. Tin ore is found at the base of the mountains.

Georgetown, the capital, is situated at the north-east extremity of Penang, and has a population of 13,000. It is built on level ground, consists of a long and broad street, intersected by other smaller ones, is clean and well supplied with water. It has a handsome church, an Armenian chapel, two Roman Catholic chapels, a court house, gaol, public school poorhouse, the government offices, and the civil and military hospitals. A few shops are kept by Europeans, but the greater number by Chinese.

Fort Conwallis is built on the north-east point of the island, close to the town. There are cantonments for troops near the town.

In 1871 the population of Penang was 71,000, who are almost entirely engaged in agriculture. Of this number the Malay race predominates, the Chinese rank next, and constitute about one fourth of the whole population, the remainder being comprised of Europeans and their descendants, natives

* Commander A. T. Powlett, H.M.S. *Avon*, 1874.

† *See* Admiralty chart: Penang, or Prince of Wales' island, No. 1,366; scale, *m* = 1 inch.

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of the Coromandel coast (named Chuliahs and Klings), Burmese, Siamese, and Bengalees.

Telegraph.—Penang has telegraphic communication by sub-marine cable with Madras, Rangoon, and Singapore.

Exports.—The exports comprise tin, sugar, spices, sago, rice, buffalo hides, and horns, rattans, gum, coffee, and opium. In 1873 the united value of exports and imports was 6,761,000*l.*

Penang is situated upon a shoal bank which on the north side extends in a circular form from Georgetown to Tanjong Puchut Muka (the north-west point), a distance of 2½ miles from the coast; at this distance a depth of 18 feet will be found. On the west side the same depth of 18 feet will be found at a distance of 3 miles; the edge of the shoal bank gradually approaches the south-west point of the island, at which place it is only a quarter of a mile distant. On the south side of the island the edge of the bank is found at a distance of 3½ miles. An extensive series of shoal banks skirts the eastern side of the island, leaving a narrow channel between them and Great Kra flat.

Two miles to the south of the south-west point of Penang is Pulo Kandy or Saddle island, high, about half a mile long and a quarter of a mile broad. Separated from the south-east point of Penang by a shoal passage of 4 cables in width is Remo island, which is steep-to on its south-east side. From Remo island a shoal bank extends in a circular form to Tanjong Garetah Sangool, the south-west point of Penang.

Pulo Jerajah, 734 feet high lying 5 miles S. by W. from Georgetown, is a bold island rising in a pyramidal form; between the island and the shore of Penang there is a channel having from 18 to 30 feet water. The east side of Pulo Jerajah is comparatively steep, a depth of 5 fathoms being found at a distance of 2 cables from the shore, except near the north-east part.

Between the south end of Pulo Jerajah and Batumou point, Penang, is Batumou flat, 1½ miles long, three-quarters of a mile broad, and having one to 3 feet water.

Middle bank joins the north end of Pulo Jerajah, and extends in a N. by E. ½ E. direction 4 miles, where it joins the bank which fringes the eastern side of Penang. Between Middle bank and the bank which borders the shore of Penang there are from 4 to 5 fathoms water. The greatest breadth of Middle bank is 1½ miles, diminishing to half a mile at its northern end; a large extent of its western side is dry. Near the centre of the eastern side is Syrang sand, a narrow ridge three-quarters of a mile long, having 7 to 9 feet water close to its eastern side. The eastern side of Middle bank is marked by three red buoys.

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CHANNELS.—The approach to the anchorage off Georgetown is by two channels, north and south. North channel is at all times preferable for large ships, as the water is deeper; south channel is dangerous for a large vessel to proceed through without a pilot.

North channel is formed between the mud-flats which skirt the shore of the mainland and of Penang, and has 25 feet water in its shoalest part, the channel of deep water lying midway between the two shores.* The shores of the mainland, being low and covered with trees, are not so conspicuous as the high land of the island; consequently the latter will generally appear nearer when the vessel is mid-channel between them. Tekoos, a small islet, lies 4 miles to the north-west of Fort point and half a mile from the shore; a white obelisk is situated on the islet. Rocks extend a cable north-east of the islet and there are other rocks south-west of it. Abreast of Tekoos the water in the fairway deepens gradually to 8 or 9 fathoms in the harbour of Georgetown. In the bay north-west of Georgetown there is a depth of 18 feet at $1\frac{1}{4}$ miles from the shore.

The fishing stakes which are situated $4\frac{1}{2}$ miles N.W. by N. from Tekoos islet and $3\frac{1}{2}$ miles from the nearest part of the shore are a guide to the deep-water channel; they are moored in 5 fathoms water, but a good berth should be given to them as there are many old stakes broken off two or three feet under water. The outer fishing stakes are marked by a ball beacon on the outer extremity. Pass a mile to the northward of these stakes and steer for the white obelisk which is situated on the mainland north-eastward of Georgetown on a S.E. $\frac{1}{4}$ S. bearing. When Cornwallis fort bears S. by E. $\frac{1}{2}$ E. alter course for the anchorage. Large vessels should not attempt to enter at night as there are no leading lights, and they are liable to run foul of the fishing stakes, some of which are in the fairway.

In tacking, the lead is a sufficient guide.

Anchorage.—The anchorage off Georgetown is situated in the narrowest part of the strait, which is here $1\frac{1}{2}$ miles broad; it is well sheltered and capable of accommodating a large number of vessels. There is deep water close to Fort point, and the water shoals gradually at half a mile from the mainland towards the shore; the best berth for a large vessel is about a quarter of a mile southward of the Fort point in 10 or 11 fathoms, and for small vessels closer to the town. It is necessary to moor as the tides run very strong.

* Navigating Lieutenant J. R. Osborn, H.M.S. *Himalaya*, 1876, states that according to information received from the harbour master, the North channel is silting up, there being 2 to 3 feet less water in the channel than shown on the chart.

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Tides.—It is high water, full and change, at Georgetown at 12h.; springs rise 9 feet, neaps 7½ feet. At springs the tides run at the rate of 3 miles an hour, and the streams turn two hours after high and low water.

South channel.—The South channel to Georgetown is formed between the bordering shoals of the south side of Penang, Jerajah island, Syrang sand and Middlebank on the west side, and Great Kra flat on the east side. The deep-water channel varies in width from 2 cables to a mile, and has 19 feet least water; it is marked by white buoys on the eastern side and by red buoys on the western side; these buoys are numbered alternately east and west, commencing with No. 1 at the north and west side of the channel, with this exception that Nos. 7 and 8 are both on the east side of the channel. Fishing stakes also extend a considerable distance into the fairway.

From the southward a vessel should not bring Pulo Kandy to bear westward of N. by W. until the east extreme of Remo island bears N.E. ½ N.; the course may then be altered for Remo island, passing 2 cables to the north-west of No. 10 (a white) buoy and between the latter and No. 9 (red) buoy; thence the vessel will be guided by the chart and by the eye to the anchorage off Georgetown.

Sailing vessels should not enter the south channel without a commanding breeze from the south or south-west, which breeze does not often blow except in the commencement of the rainy season, August and September.

PILOTS are stationed at Pulo Jerajah and will board vessels on the proper signals being made.

The best time to leave the harbour of Penang during the north-east monsoon is just before sunset.

GREAT KRA FLAT.—This flat extends along shore from abreast Pry river to Pulo Tallong, a distance of 60 miles in a S. by E. direction, and has a breadth of 10 to 12 miles. The northern end of the flat is situated 2 miles S.S.E. from Fort point, Georgetown, and three-quarters of a mile to the westward of the entrance of Pry river, it thence continues in the shape of a tongue as far as Kra islands, where it joins the coast and then continues as a bordering bank to its southern limit; between the east side of this tongue and the shore there is a channel of 3 to 7 fathoms depth. On the outer edge of the flat there is a depth of 3 fathoms shoaling towards the shore. In some parts the flat is dry at low water. Outside Kra flat the water deepens to 10 fathoms at a distance of one to 5 miles from its edge.

Tides.—The tidal streams from the rivers which discharge upon Great Kra flat set strongly across the flat; caution is therefore required on the flood.*

* Navigating Sub-Lieutenant G. F. Whitmore, H.M.S. *Midge*, 1873.

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In the offing between Penang and Parcelar hill the tides during springs are regular, the flood setting to the south-east, the ebb north-west, at the rate of 2½ or 3 miles an hour. During neaps there is no perceptible tide.

Rivers.—The rivers Pry, Joru, Junjong, Tenga, and Kreean have their exit on the coast abreast Penang.

Korrow or Kurow river, 4 miles to the southward of Kreean river, is navigable for a launch drawing 4½ feet, for a distance of 40 miles.

Kra islands lie off the entrance of Junjong river, about a mile distant. North Kra island is a mile long in a north and south direction; South Kra is three-quarters of a mile long in a north-east and south-west direction, and separated from North Kra by a passage having 4 feet water. Eastward of Kra islands the depths are from 6 to 12 feet as far as the bank, which extends to the north-west from the south side of the entrance to Junjong river. There is a channel of not less than 4 fathoms leading from Georgetown to Kra islands.

The COAST from Penang to False Dinding has a general S.S.E. direction, forms several bights, and is low and thickly wooded; throughout this extent the coast is bordered by Great Kra flat already mentioned. On this tract of coast many rivers discharge themselves.*

LARUT RIVER.—The entrance of this river in lat. 4° 43′ N., long. 100° 33′ E., may be known by a gap in the mountains situated over the entrance; the gap shows as a hummock and may be easily recognised when the vessel is nearing the land; from the north it opens out on the bearing E. ¼ S., and from the southward on the bearing E. by N. ¾ N.

H.M.S. *Midge* in June 1873 anchored off the entrance of the river, 7 miles distant, in 17 feet, with the following bearings, namely, South mound, N.E. ½ E.; North mound, N. by E.; Pulo Kandy, N.N.W. ¾ W. A small steam vessel by which the *Midge* was accompanied proceeded from the anchorage mentioned for the river; she steered E. by S. for the high peak of the mountains on the south side of the river, and remained upon that course until shoaling the water to 15 feet, then altered course to East, when the soundings were 11 feet at a distance (by masthead angles) of 2 miles from the *Midge*; this was the commencement of the bar, and the water continued to shoal to 8 feet at high-water neaps; that was the shoalest cast obtained, and was $4\frac{7}{10}$ miles from the *Midge*. Inside the bar the water deepened quickly to 18 and 21 feet. Proceeding up the river the north bank was kept onboard until a small river, the Sapatang, opened on that side, then steered across to a similar opening on the south bank, off which the vessel anchored. The river apparently continued in an E. by S.

* Selensing river, the entrance of which is 9 miles to the northward of Larut river, is said to have a depth of 3 feet on its bar at low water. It is also said that vessels drawing 8 feet may pass through Selensing river into Larut river.

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direction for some distance, and then turned to the northward. Including canoe navigation the navigable course of Larut river has been estimated at 25 miles.

In August following H.M.S. *Midge*, drawing 8½ feet, twice crossed the bar of Larut river.*

Larut river "should not be approached without a pilot, the only guides are some fishing stakes, and they are shifted very often. The bar is about 3 miles from the entrance to the river, and has only 10 feet on it at high water."† A pilot may generally be obtained at Pulo Dinding.

Rivers.—Between Larut river and Dinding islands are the mouths of the rivers Trong, Juru Mas, and Bruas. The Trong and Bruas are navigable by canoes for 56 miles. The Juru Mas is merely a tidal estuary.

False Dinding is formed by the two highest peaks of a short range of hills near the coast to the northward of Pulo Dinding, and by a vessel approaching from the northward are seen before Pulo Dinding; they derive their name from so nearly resembling the peaks of Pulo Dinding.

Pulo Tallong is a small islet lying a quarter of a mile from the coast in lat. 4° 25′ S., long. 100° 33′ E. Between the islet and the shore there is a depth of 12 fathoms, north and south of the islet 15 and 18 feet; close to the westward a depth of 7 fathoms. Westward of Pulo Tallong the shore bank again extends seaward a distance of 3½ miles, and touches the shore 7 miles to the southward; on this part of the bank the soundings are from 12 to 15 feet, small shells.

GREAT DINDING ISLAND (PULO PANCORE) is 5 miles long in a N.W. by N. and S.E. by S. direction, 2 miles broad, and is separated from the mainland by a channel one to 2 miles wide, named Dinding channel. The island is mountainous and densely wooded; the highest part is 1,318 feet high, and situated about 2 miles S.E. of the north-west point. On the north and south extremes are two hills, respectively 748 and 992 feet high. Two other mountains rise near the centre of the island, and attain a height of more than 1,000 feet.‡

The woods of Great Dinding island consist of ebony, sandal wood, several varieties of gum, india-rubber, and palm trees, bamboo, and the following native woods, namely, damarloud, nebong, kampenis, ringas, murbar,—the last-named three are similar to mahogany; murbar is much used by the natives of Malacca strait for the manufacture of furniture. To the above mentioned products may be added coffee and cotton. The whole of the woods are farmed out by the colonial government at an annual rental.

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* Commander J. F. G. Grant, R.N., and Navigating Sub-Lieutenant G. F. Whitmore H.M.S. *Midge*.

† Remark Book, H.M.S. *Hornet*, 1872.

‡ *See* Admiralty chart: Dinding island and channel No. 792; scale, *m* = 3 inches.

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The population of the island consists of about 250 Bataks or Malayan native hill tribes, and 100 Chinese.

Poultry, eggs, and occasionally pigs, may be procured at most of the native villages at reasonable prices. Fish are plentiful, and may be caught with the seine in the bays; turtle may also be obtained in the season. Fresh water of good quality is plentiful at almost all the villages, but owing to want of proper conduits can only be obtained in small quantities.

Animal and vegetable life abound, but at present the density of the jungle renders the animals very difficult of approach. Great Dinding is known to contain the following animals, namely, hogs, deer (moose and other kinds), monkeys, civet cat, boa-constrictors, several kinds of cobra and other deadly snakes, alligators, guanas, lizards, scorpions, centipedes.

Of birds, cranes and pigeons. Of fruits, durian, pineapple, mango, and pomegranates.

Great Dinding island, and the adjacent coast, commencing at Pulo Katta and extending 22 miles in a northerly direction, is now British territory.

Wedge rock, 3 feet above high water, is, as its name implies, wedge-shaped. It lies near the west edge of North bank S.W. by W. $1\frac{1}{10}$ miles from Tanjong Hantu, N. $\frac{3}{4}$ W. 2 miles from the north point of Great Dinding.

North bank, a shoal having a depth of 3 to 15 feet, mud and sand, lies in the north entrance of Dinding channel, and with the shoal bank which skirts the main land adjacent nearly fills the north entrance of that channel. Its southern part is tongue-shaped, the extremity, having a depth of 9 to 15 feet, lying N.E. by E. $\frac{1}{2}$ E. half a mile distant from Scorpion point (Great Dinding). The southern edge of North bank, forming the north side of the north entrance to Dinding channel, trends thence in a general N.W. by W. direction $2\frac{1}{2}$ miles to the western extremity of the bank, at which part there is a depth of 15 feet.

An outlying patch of 3 fathoms is situated at a distance of 7 cables W. by S. from Wedge rock, and 2 miles N. by W. from North-west point.

North-west islet, 100 feet high, is small, thickly wooded, and difficult to discern until close; it lies N. by W. $\frac{1}{2}$ W. 5 cables distant from the north-west point of Great Dinding; the islet being separated from the mainland by a channel in which there is a depth of $3\frac{1}{2}$ to 7 fathoms, the deepest water being near the islet. There is deep water within half a cable of the islet, except on the west side, where at three-quarters of a cable distant there is a sunken rock having 3 feet water. A small islet, 7 feet high, lies nearly midway between North-west islet and Great Dinding.

North point.—The shore of Great Dinding, between North-west point and North point, is bordered by a shoal flat, which extending from either point forms a tongue, the extremity of which is nearly midway

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between the two points, and extends off shore a distance of 1½ cables. On the outer end of this tongue is Grasshopper islet, 120 feet high and wooded.

Off-lying rock, 2 feet high, occupying a shoal space of half a cable in extent, east and west, lies East 2 cables from North point. Midway between the rock and the shore there are depths of 5 to 8½ fathoms.

Shoal bay is formed between a point which is half a mile to the south-east of North point, and Scorpion point. At the head of the bay there is a fishing village. The shoal, which fills the bay, extends from the north point of the bay 2 cables to the eastward, and its outer edge of 2 fathoms, with 7 fathoms close-to, is found at 1½ cables North of Scorpion point.

Scorpion point.—Charybdis rock, a pinnacle having a depth of 2 feet, lies North 1¼ cables from Scorpion point. The 2-fathom bank surrounding extends a quarter of a cable farther north. The ground is foul between Charybdis rock and Scorpion point.

Shoal water of 10 to 17 feet, extends a distance of 2½ cables to the north-east and east of Scorpion point, and also fills the bay formed to the north of Table rock.

Bower patch, having a depth of 15 feet, is nearly circular, about half a cable in diameter, and lies N. by W. ¼ W. 3 cables from Scorpion point. The summit of North-west islet, in line with North point, leads on to Bower patch. The summit open of North point, and bearing W. by N. ¾ N., leads north of Bower patch in 4 fathoms least water.

Table rock, 22 feet high, is situated a mile to the south-east of Scorpion point, and about a cable from the shore.

The east shore of Great Dinding from Table rock, has a general S. by E. direction; and at the distance of one cable outside the small bays formed in its shores not less than 6½ fathoms water will be found.

Port Pancore, situated a mile to the southward of Table rock, consists of a police station and a few houses scattered on the beach. The ground in the vicinity is swampy.

At the north part of the town near the entrance of a small creek a pier is in course of construction by the Colonial government, which pier it is contemplated to extend to a depth of 3 fathoms water.

At port Pancore is a small government depôt for coal, where from 60 to 100 tons are usually kept for the supply of government and other coasting steam vessels. Wood for fuel is also procurable.*

* The Colonial Government have arranged (August 1876) for steam vessels to leave Penang on alternate Sundays, calling at port Pancore, Perak, Sangalore, Klang, and Lingie rivers, Malacca and Singapore; and leaving Singapore for the same places on alternate Wednesdays.

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Small vessels may be readily and safely grounded for examination or slight repairs between tides. Labour may be obtained at the rate of 40 cents per day per man.

Position.—The position of the observation spot at port Pancore is lat. 4° 13′ 19″ N., long. 100° 34′ 8″ E., depending on Fullerton battery at Singapore being in long. 103° 51′ 18″ E.

Anchorage.—Abreast of port Pancore there will be found secure anchorage for vessels of large draught, and sufficient space for several vessels to moor, The best berth is with the shore end of the pier bearing W.N.W., distant 3 cables, in 8 fathoms, mud. In this berth the vessel will be distant 3 cables from the edge of East bank, the shoal which skirts the mainland adjacent.

Bathing is unsafe on account of the numerous alligators which swim across the channel.

South-east point, the south-east extremity of Great Dinding, is of conical shape, 413 feet high, and within half a cable of the point there is a depth of 6 fathoms.

West Anchorage.—The west shore of Great Dinding is deeply indented, the bays however are comparatively shallow. On this side of the island, in the bay north of Long island, there is fair anchorage in 4 fathoms, sand, 2 cables from Long island. This anchorage is sheltered from all winds, except those from W.S.W. to North.

Between Pulo Pancore Laut, or Little Dinding island, and Great Dinding there is good holding ground in 3½ fathoms, at 2½ cables from the main island, and with the north peak of Little Dinding bearing W.S.W.

On the south and west sides of Great Dinding, without entering the bays, deep water will be found within a cable of the shore.

The MAINLAND.—Tanjong Hantu, 2¾ miles to the northward of North point of Great Dinding, is a sloping point whose summit is 757 feet high.

The shore from Tanjong Hantu to point Motts (north entrance point of Dinding river) is skirted by a shoal bank, having a depth of 3 to 12 feet, which extends from the shore a distance of 8 to 6 cables; gradually diminishing its distance from the shore south of Mudge bluff as point Motts is approached, where it is only 1½ cables distant from the shore.

Between the bank just mentioned and North bank there is a channel suitable for vessels of not more than 10 feet draught of water; but the passage is difficult, and should not be attempted without local knowledge. Pass Tanjong Hantu at about 2 cables distant on a S. ¼ E. course, after which steer S.S.E. ½ E.; this course will lead direct to the centre of Dinding river passage, and in not less than 4 fathoms water. H.M.S. *Nassau*, drawing 13 feet, passed through the channel at three-quarters flood.

Dinding river, perhaps the only river without a bar in Malacca

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strait, has a deep and clear entrance, which between Mehegan and Motts points is 8 cables wide. A channel 3 cables wide, and having 5 to 9 fathoms, extends 3 miles up the river, the farthest point reached by the surveying parties. The water shoals more gradually towards the north than towards the south, which is rocky. Yellow cliff 14 feet high and Red cliff 26 feet high, both on the south side of the river, are conspicuous. On the north shore of Dinding river at the west side of the entrance of Sungel Sumpit (small river) is situated a police station, a conspicuous bungalow standing on a sand spit, and easily recognised by the palm trees to the westward of it. On the south shore of Dinding river, opposite the police station, is a native village.

Tides.—In Dinding river the flood and ebb tides set at the rate of 3½ knots at springs, and 2 knots at neaps.*

East bank commences at Mehegan point, and skirting the shore for 1¼ miles to the southward, thence trends to the westward and to the northward in a long narrow tongue, dry in places; the north point of the tongue having a depth of 12 feet, is 8 cables S.W. by W. ½ W. from Motts point, and the same distance E. ½ S. from Scorpion point. There is thus formed between the tongue and Mehegan point a deep hole or bay in which there is a depth of 4 to 6 fathoms. East bank skirts the mainland as far as Tanjong Katta; its western edge from the north extremity of the tongue trending nearly parallel to the adjacent shore of Great Dinding, at a distance of 4 or 5 cables. The depths on the western edge of the bank vary from 3 to 15 feet, mud. Numerous fishing stakes are moored on the bank.

Pulo Katta, a small wooded islet, 114 feet high, stands on the edge of the bank near Tanjong Katta, and is separated from the mainland by a shoal and rocky passage 3 or 4 cables wide.

The coast between False Dinding and Pulo Katta is rocky with undulating hills close to the sea.

DINDING CHANNEL.—North Entrance.—Except in cases of emergency North entrance is not recommended for vessels of more than 12 feet draught, for although with care and attention not less than 4 fathoms water will be obtained, yet the passage is narrow, being only 2 cables wide in the narrowest parts. As the eye, however, is the surest guide, vessels should only use this passage when the sun is in a favourable position for showing up the shoals; due attention should be paid to the speed of the vessel and to the set of the tide.†

* That the flood stream should equal the ebb stream in velocity is remarkable.

† For vessels from Penang bound through the North entrance to the anchorage off port Pancore, there is a saving in distance of only 5 or 6 miles, as compared with the route round the south end of Dinding island, and a questionable saving in time.

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Give a wide berth to North bank, the western limit of which bears North from the north-west point of Great Dinding. To clear this and the outlying 3-fathoms patch already mentioned, the north peak of Great Dinding should not be brought to bear southward of S.E. ¼ S. North-west islet will be sighted ahead on this bearing, and passing it on the starboard hand at half a cable distant, steer E. by S. ¾ S. for Offlying rock, 2 feet high. Pass Offlying rock also on the starboard hand, at half a cable distant; then alter course quickly to starboard, and bring the summit of North-west islet to bear W. by N. ¾ N. and midway between Offlying rock and North point. This mark will lead a cable north of Bower patch, and one cable south of a projecting part of North bank. When Scorpion point bears S.W., alter course to starboard, and bring Table rock to bear S. by E. ¼ E., then steer to pass the latter one or 1½ cables distant, and thence, preserving the same distance from the island, to the anchorage recommended off port Pancore.

If bound to Dinding river, keep North-west islet bearing W. by N. ¾ N., and when Scorpion point bears S.W. sheer out a little to the southward to give the south-east extreme of North bank a wider berth, and bring the leading mark on again before the tongue of South bank is approached.

South entrance.—From the southward, having passed Fairway rock and Pulo Katta, steer to bring Table rock in line with Tanjong Hantu bearing N. by W. ¼ W.; keep these marks in line, which will lead nearly mid-channel to the anchorage off port Pancore.

If wishing to enter Dinding river steer from the anchorage to pass Table rock 2 cables distant, and thence midway between East bank and the island, until the north summit of Great Dinding bears S.W. ½ S.; then bring the summit of North-west islet bearing W. by N. ¾ N. open of North point, and proceed on that course to the entrance of the river.

Tides.—It is high water full and change in Dinding channel at 3h. 15m.; springs rise 9 feet, neaps 5 feet. The flood stream in the north entrance sets fairly through the channel. In Dinding channel and south entrance the ebb sets N.N.E., and flood S.S.W., at the rate of 2 to 3 knots at springs.

To the south-west of Great Dinding the flood sets S.E., and ebb N.W., and sets through the narrow passage between Pulo Pancore Laut and Great Dinding at the rate of 2 to 3½ knots at springs.

Fairway rock, 27 feet high, lies S. by W. ½ W. $3\frac{9}{10}$ miles from south-east point of Great Dinding; a sunken rock, having less than 6 feet water, lies half a cable from its north side, and a depth of 4 fathoms near the west side of the rock. There are 9 to 16 fathoms water between the rock and the mainland, and 10 to 20 fathoms between the rock and Great Dinding.

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PERAH or PERAK (Silver) **RIVER.**—Eastward of Pulo Katta the coast is low, covered with jungle, and forms a bight to the entrance of Perah river, which is 8 miles to the eastward of Sambilang islands. The bight is skirted by a bank which extends 2 to 5 miles from the coast, and blocks up the entrance of Perah river. In the middle and south side of the entrance the water is shoal, there being many places dry at low water. The river inside is wide and deep, and is navigable for vessels of 11 feet draught as far as Durian Sabatang, 43 miles from the entrance, and for steam launches as far as Kota Lumut, 57 miles from the entrance. The only part difficult of navigation is the entrance.

Perah river is supposed to rise in Siamese territory, near the source of Muda river, the northern boundary of province Wellesley. It flows due South with many tortuous windings for about 100 miles as far as Durian Sabatang, from which it runs in a westerly direction to Malacca strait. The banks of the river are mostly low and covered with jungle.

The following directions for Perah river by Commander U. C. Singleton, and Navigating Sub-Lieutenant V. D. Hughes, H.M.S. *Ringdove*, are applicable to the state of the river in the month of January 1876 :—

A vessel entering Perah river should close the north coast, and having passed Pulo Katta, bring the south point of Pulo Pancore or Great Dinding to bear N.W. by W. ½ W., and nearly touching the north point of Little Dinding island. This mark will lead over the bar in 11 feet at half-tide neaps, and 17 feet at high-water springs, and past the outer clump of fishing stakes at about three-quarters of a mile on the starboard hand ; the bar is situated N.E. by E. from these stakes.

[In June 1876 the *Ringdove* crossed the bar at high-water neaps with the same marks, and had 22 feet least water. Also H.M.S. *Magpie*, crossing on 26th December 1876, had 25 feet least water at one hour before high water ; the outer fishing-stakes bore S. by E. The channel of deepest water is probably very narrow, or it may shift. *See* page 61. Navigating Lieutenant Pownal Aplin, H.M.S. *Modeste*, 1876, remarks, that vessels of 9 feet draught may always enter at high water ; and that vessels of greater draught should not attempt it except at springs, unless in cases of urgency.*]

Keeping the same marks in line a second clump of fishing-stakes is passed on the starboard hand about a quarter of a mile distant ; then alter course gradually to starboard, and pass between this clump and another large clump bearing E. by S. Passing the latter at a quarter of a mile

* Mr. G. Elliott, Master R.N., H.M.S. *Agincourt*, 1846, remarked that it was "very difficult to find a passage over the bar with more than 12 feet water. No vessel should attempt to go over the bar without first sounding.

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distant, the vessel should steer along the bank for the point on the north side of the entrance, keeping about a half or three-quarters of a mile off shore, and passing outside some small fishing-stakes moored close to the bank, until the mouth of the river is reached. Avoid the first point on the port hand, as there is a long spit extending off it, and steer over to the south or left bank of the river, keeping it at a distance of 50 to 70 yards, as there is a shoal in the centre of the river.

A knoll having a depth of 6 feet, on which H.M.S. *Moorhen* grounded in February 1877, lies near the south shore of the river, 3½ miles within the entrance, with the following bearings:—North entrance point of river in line with south end of highest Sambilang island N. 88° W. (*true*); left extreme up river (first point) N. 34° E. (*true*).

Between the entrance of the river and Kota Striah, distant 25 miles from the bar, on the route recommended, soundings of 2½ to 5 fathoms will have been obtained. There is anchorage off Kota Striah, in 3½ to 4 fathoms, stiff mud, at 2½ cables from the shore.

Caution.—Commander C. V. Anson, H.M.S. *Magpie*, 1876, remarks that the banks in Perah river frequently shift after floods or freshets. The *Magpie*, in the month of December, grounded on a patch having a depth of 6 feet, hitherto unknown, off Kota Striah. When aground the red-tiled house at Kotah Striah bore S.E., and the point on the left bank of the river W. by N. ¾ N. The shoal is situated in the fairway or concave side of the river, and may be avoided by keeping quite close to the right bank at this part, or by keeping mid-channel.

Leaving Kota Striah cross over to the left bank, and give the first point on the right bank a good berth; then steer almost mid-channel, but preferring the left to the right bank; and as a general rule avoid the points.

Soundings of 6 to 11 fathoms will be obtained in the channel between Kota Striah and Battarabbit.

On arriving at Single-tree point (a point having a large tree on its extreme) just below Battarabbit (Sultan Abdullah's village), give it a good berth, and after rounding it steer in for Battarabbit, which will then be in sight in the bend on the left bank, but keeping the left bank on board until the first point above Battarabbit is neared, then sheer over to the right bank until the point is rounded. Return again to the left bank and keep it close on board, as between this point and Durian Sabatang there are numerous sandbanks in the centre of the river and also off the points.

After passing one more point the vessel will enter Long reach, and should keep close in to the left bank throughout the reach; then steer over to the opposite bank, steering about a cable above the point. The navigation of this part is very difficult, owing to the narrow passage between the

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sandbanks and the absence of landmarks. Keep close in to the right bank until a small island is passed on the port hand, and an opening in the jungle is reached, on passing which, and when about a cable from the island, steer for the point on the left bank, allowing a little for the tide, and keep this bank on board as far as Durian Sabatang.

Great care is necessary in this last crossing, the deep channel being very narrow, and the sandbanks on each side dry at low water. The least water found by the *Ringdove* in the channel at low-water spring tides was 8 feet, and at high-water springs 18 feet.*

Off Durian Sabatang the vessel should moor, giving just room enough to swing clear of the bathing houses, and of the sandbank dry at low water, which extending from the north shore occupies three-fourths of the width of the river.

Durian Sabatang, in lat. 4° 2′ N., long. 101° 1′ E. (approximate), the highest point which may be reached by gun vessels drawing 11 feet, is 43 miles from the entrance. The town consists of 80 or 90 houses, the best of which are inhabited by Chinese traders. The population consists of 400 or 500 Malays and the same number of Chinese. The trade, which is chiefly in tin, is in the hands of the Chinese, and is carried on entirely by junks. The tin mines are on the shores of Behru river, which falls into the Perah at this place.

Water is of indifferent quality, the best is obtained from a stream flowing over the sandbank opposite the village.

Tides.—It is high water full and change at Durian Sabatang at 5h. 45m.; springs rise 12 feet, neaps rise 10 feet; the ebb stream runs at the rate of 2½ to 3 knots, the duration of the flood varies considerably according to the rains. The tides reach to the entrance of Kinta river.

The water in Perah river is fresh 2 miles above Kota Striah.

Bandar Bahru, the site of the British residency,* is estimated to be 9 miles above Durian Sabatang. The residency is built on a small island, the creek which surrounds the island being dry when the river is low.

Kota Lumut, a village on the right bank 5 miles above the residency, and three-quarters of a mile below the entrance to Kinta river, and about 57 miles from the entrance of Perah river is the highest point steam launches can reach.

No trustworthy pilots are to be obtained.

Kinta River (a tributary of Perah).—Commander Singleton remarks that returning on the 6th January 1876, from service with the

* This bend may be avoided now, as there is a landing-place just below where the new residency is established; the distance of the latter from Durian Sabatang is about three-quarters of a mile, with a good road leading to the town.—Sub-lieutenant F. St. G. Rich, H.M.S. *Moorhen*, 1877.

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naval Brigade at Kinta, the river was found to be greatly swollen from the few previous days' rain, and the sandbanks, which there had been great difficulty in passing, had now sufficient water to allow of boats going over them. The British residency at Bandar Bahru was entirely flooded, and the guns landed were entirely under water. The river, which had risen at least 20 feet, fell suddenly about the 10th January, and owing to the shifting bottom (fine sand), the entire course was altered. The current on this occasion ran at the rate of 5 or 6 knots.

The state of Perak, adjoining Province Wellesley (British), on the north, and bounded by the entrance of Berman river on the south, has a coast line of about 80 miles in length, and a breadth of 50 miles. Part of the coast line of line of Perak State is now British territory. *See* page 2. The whole state is a vast jungle, with a few scattered villages. The soil is said to be extremely fertile, and capable under the influences of the mild climate of producing coffee, suguar, indigo, and other tropical plants; the chief cultivation consists in rice. The chief article of trade is tin, brought from the workings situated near that foot of the mountain range, and sent to Penang. The tin mines are in the hands of the Chinese.

SAMBILANG or Nine ISLANDS,* lying to the westward of the entrance of Perah river, occupy a space of 6 miles in a N.E. and S.W. direction, they are mostly small, bluff, high islands, covered with trees, and may be seen from a distance of 20 miles. The highest island is a about 500 feet high. White rock, the south-westernmost of the group is 15 feet high and conspicuous, it lies in lat. 4° 0′ N., long. 100° 29′ E. The southern island lies E. by S. ½ S. 1¼ miles from White rock. Black rock, lying N. by E. nearly a mile distant from White rock, is small, low, and hardly discernible. From the north-easternmost islet Fairway rock bears N.N.W. ¼ W. distant 3¼ miles. The edge of the bank (depth of 3 fathoms) which lies off Perah river is 4 miles distant from the nearest of the Sambilang islands. The water deepens gradually to 10 fathoms between the bank and the islands. The Sambilangs are steep-to, and should be approached at night with great caution; there are from 23 to 26 fathoms close outside the islands, and the same depths are found very near and amongst the islands.

Tides.—Springs rise 12 feet, neaps 10½ feet.

DIRECTIONS.—The north and north-east winds frequently blow strong between Pulo Jarra and the islands at the north end of the strait; vessels, therefore, from the southward bound to Penang during the north-east monsoon should, after passing Dinding islands, keep near the edge of the mud-bank which lines the coast, that they may not be delayed with the strong N.E. wind and short sea likely to prevail in the offing near Penang.

* These islands are improperly named Nine islands, as there are more than that number.—Commander C. Y. Ward, H.M.I.N.

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PULO JARRA, in lat. 3° 58½′ N., long. 100° 5′ E., is a conical island about 500 feet high, half a mile long, a quarter of a mile broad, and covered with trees. From the nearest of the Sambilang islands Pulo Jarra is 23 miles distant. The islet is steep-to all round, with the exception of a cluster of boulders which extend from the north-east side about a cable distant; there is a depth of 10 fathoms close outside the boulders, deepening to no bottom at 20 fathoms three-quarters of a mile distant.* From 14 to 23 fathoms will be found near other parts of the islet.

In mid-channel between Pulo Jarra and Sambilang islands the soundings are from 25 to 40 fathoms. Pulo Jarra may be passed on either side, but for a sailing vessel bound to the south-east it preferable to pass between it and Sambilang islands, for the current often sets strong to the north-west in the middle of the strait, and calms are more prevalent in the middle of the strait than near the coast.

The COAST from the entrance of Perah river to the entrance of Salangore river is low, covered with jungle, and skirted by a mud-bank. on the edge of which a depth of 3 fathoms is found at one to five miles from the shore.

Berman river.—The entrance of this river, situated about 13 miles to the southward of the entrance of Perah river, is about 2 miles wide. The river, one of the finest on the Malay coast, has 17 feet on the bar at high water, and is said to be navigable for steam launches for about 100 miles; the snags would then prevent further progress.

H.M.S. *Moorhen*, drawing 10¼ feet, crossed the bar of Berman river in February 1877, and proceeded as far as the village of Sabba, about 23 miles from the entrance. The vessel crossed at one hour before high water, and had not less than 16 feet on the bar, and not less than 17 feet, bottom soft mud, in the channel to Sabba, where she moored in 5¾ fathoms. But in proceeding down the river only 6 feet was found at low water, 5 or 6 miles below Sabba. Lieutenant John Hope gives the following directions for entering:—Keep the outer fishing stakes (to the northward) well open of higher Sambilang until the village at the entrance of the river bears about N.N.E.; then steer in for the village, passing between the fishing stakes. In the first reach, which is long and shallow, keep in mid channel; then follow the bends of the river, avoiding the points. The deepest water is almost invariably close in to where the nepa palms grow, and shoalest where there are mangroves. The tides run strong and rise rapidly; on March 1st the tide rose 5 feet in three-quarters of an hour after low water.

Between Bruas river and Berman river fishing stations consisting of

* Navigating Sub-Lieutenant G. F. Whitmore, H.M.S. *Midge*, 1873.

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bamboo enclosures, thirty or forty yards square, strengthened by cross poles, and having a solid platform well above the water, are situated along the coast, a few miles apart. They are almost always in 5 fathoms water, rarely in less, and are therefore useful in pointing out where the water shoals.*

SALANGORE RIVER.—The entrance to this river may be recognised by Salangore hill, situated on the south side of the entrance; the hill is high, conspicuous, covered with trees, and surmounted by a fort. The coast mud-bank extends across the mouth of the river; the outer edge of 18 feet is about 3½ miles west of the entrance, and should not be approached under 5 or 6 fathoms until Sangalore hill bears N.E. ¾ E. The channel across the bank into the river has a depth of 3 feet at low water, and 18 feet at high water springs; the deepest water is marked by a large fishing stake which bears S.W. ¾ W. from Salangore hill, and N. ¼ W. from Pulo Anza. Steering N.E. ¾ E. for Sangalore hill pass close to this fishing stake and thence between two rows of fishing stakes for the entrance of the river. A wide berth should be given to the west point of the entrance.

Salangore river is navigable for boats for about 19 miles, and for steam vessels drawing 8 feet 14 miles, or as far as Campong Seear, but there is little room to swing there. The bottom is soft mud. There is no danger in the river for a vessel of that draught except a mud-bank, with 3 feet water, situated about 3 or 4 miles from the entrance of the river, and about half a mile westward a clump of attap trees 50 feet high. Close to the shore on either side of the mud-bank there is deep water. Above Campong Seear there are several sand-banks.

The river is tortuous in its course. The deepest water is found on the concave side of the curves. The banks of the river are very low throughout, and lined with attap and mangrove trees, affording concealment to the natives, who are often hostile. There are several stockades at the entrance of the river, and one at Campong (or village) Queor.† Crocodiles are numerous.‡

Salangore was formerly frequented for tin and other articles of trade, which articles are now carried to Penang in coasting proas.

Caution.—Vessels at anchor off Salangore river should be on their guard, never allowing any proas to approach them at night, for here, as well as in other parts of Malacca strait, piratical proas frequently lurk about in search of defenceless vessels.

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* Navigating Lieutenant W. H. Stephens, H.M.S. *Egeria*, 1875.

† H.M.S. *Rinaldo*, drawing 15 feet, entered the river in 1871, and bombarded the forts on both sides of the entrance.

‡ Remarks on Salangore river by Commander R. M. Blomfield, R.N., and Navigating Sub-Lieutenant J. S. Barrett, H.M.S. *Teazer*, 1871.

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Tides.—It is high water, full and change, at Salangore river at 5h.; springs rise 15 feet, neaps 12 feet. The flood stream runs five hours, the ebb seven, at the rate of 5 miles an hour.

PULO ANZA, or Mudancoos, are two islets lying S. by W. 9½ miles from Salangore hill, and on the east edge of a bank which extends 16 miles to the north-west of Pulo Colong. There are from 4 to 7 fathoms close to the eastward of the islets.

The coast between Salangore and Colong islands is thickly wooded, low, and overflown in most parts at high water. It is skirted by the mud-bank, already mentioned, which is dry at low water, and extends 3 miles from the coast abreast Bottle islets, but near the north end of Pulo Colong approaching the coast within a quarter of a mile.

Botel or Bottle Islets are a group of four, lying near the coast to the eastward of Pulo Anza; they are situated on a shoal bank, and occupy a space of 1¾ miles N.E. and S.W., the outer one being 2 miles from the shore. Calcutta or Sail rock, a dangerous rock, covered at half tide, and steep-to, lies S.W. ½ S. three-quarters of a mile distant from Pulo Tekolo, the south-western islet, and E. by N. 2⅝ miles from Pulo Anza large island. Between the outer Bottle islet and Pulo Anza there is a channel a half to 2½ miles wide, and having 25 feet least water, leading to the eastward of Pulo Colong.

PULO COLONG, or CALLAM.—This island is separated from the mainland by Colong strait, which is at this part a mile wide. The island is low and wooded, about 7 miles long in a N.E. and S.W. direction, and 4 miles broad. Close to the north-west side of the island is an island 2½ miles long in an E.N.E. and W.S.W. direction, and three-quarters of a mile broad. Near the south-west side of Pulo Colong, and extending a distance of 5 miles to the south-west, is a group of five islands, the two largest of which form one side of Colong strait. All these islands are low, formed of black mud, and covered with mangroves. Pulo Colong, together with the islands mentioned, are situated on a shoal mud-bank which extends 16 miles to the north-west of Pulo Colong, and 6¼ miles to the south-west of the same island. At its north-western part the bank is 4 to 6 miles wide, and has from 6 to 10 feet water, which breaks at half tide.

PULO LUMAUT.—Separated from the south-east point of Pulo Colong by Colong strait, at this part nearly 3 cables wide, is the north-west point of Pulo Lumaut, an island which is 9 miles long in a N.E. and S.W. direction and three-quarters to 2½ miles broad.

Light.—A temporary *red* light, visible in clear weather 3 miles, is exhibited from the south-west point of Pulo Lumaut. This light will shortly be replaced by a more powerful light.

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LUMAUT STRAIT.—The eastern side of Pulo Lumaut is separated from the mainland by Lumaut strait, half a mile wide, and having very strong tides. This strait, though deep in most parts, is not an advisable channel for even the smallest vessels.

In the reach between the entrances of Klang and Langat rivers, at about 3 miles from the village of Lower Klang, there is a shoal having a depth of 4 or 5 feet, bottom hard sand. To pass from Klang river to Langat river keep the shore of the mainland close on-board until arriving off the point at the entrance of Langat river. From this point to the other side of the bar the services of a pilot are necessary.*

COLONG STRAIT.—Pulo Colong and its islands to the south-west, with Pulo Lumaut to the south, form a channel or strait named Colong, which was formerly used by vessels of moderate size. It was a quiet and easy navigation, under the lee of the land, by which the dangers of the North and South sands were avoided; but since the establishment of a lighthouse on One Fathom bank (North sands) much of the danger and difficulties have been avoided, so that this strait can no longer be recommended as a convenient passage, although it is still used by coasting steam vessels.

First, or North reach extends S. ½ E. 5 miles, and is one mile in breadth. It has no dangers, there being 5 or 6 fathoms close to the banks on either side. The depths in mid-channel are 3½ to 8 fathoms. On the western side a narrow bank, having 21 feet, fringes the shore, and there is a small bank of 13 feet close to the north entrance of Lumaut strait. The strait here branches to the eastward and south-westward; the eastern branch is Lumaut strait, the south-western is Colong strait.

The second reach of Colong strait takes a W.S.W. direction for 2½ miles, and is clear of danger by generally keeping nearer to the shore of Lumaut than to the opposite side. Nearly mid-channel between Deepwater point (south-east point of Pulo Colong) and the north-west end of Pulo Lumaut is a bank having 24 feet, and a spit extends to the northward 2 cables from the entrance of a creek in Pulo Lumaut a mile to the south-west of Deepwater point. A bank on the western side, dry at low water and steep-to, is easily seen, there being some low bushes on it which are at all times visible. After passing the bank, the third reach, which takes a south-westerly direction to the sea, is entered, and is little more than a quarter of a mile wide in its narrowest part, but deep and safe; the depths in the middle are 8 to 11 fathoms, and 6 to 7 fathoms close to the banks on either side.

DIRECTIONS from the NORTHWARD.—From Salangore river bound through Colong strait steer for Pulo Anza bearing South,

* Commander A. T. Powlett, R.N., H.M.S. *Avon*, 1874.

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which may be approached close to its eastern side, and take care not to shoal less than 6 fathoms near the bank which lies to the north and west of that islet. Between Pulo Anza and the south-west Bottle islet the passage is 2½ miles wide, and has 4 to 7 fathoms water. From half a mile eastward of Pulo Anza a course S.E. ¼ S. leads into the strait, which is difficult to distinguish until close-to. In approaching the north entrance of Colong strait, by keeping three-quarters of a mile distant from the mainland, will lead in deep water.

From abreast Green point (north-east extreme of Colong island) keep in mid-channel for a couple of miles, afterwards keeping towards the western shore to clear the bank of 3¼ fathoms which lies nearly in the centre of the channel. In passing Deepwater point caution should be observed, as the tides set very strong past the north end of Pulo Lumaut.

Working into Colong strait from Salangore road, vessels should not stand into less than 4 fathoms towards the shore, and 6 fathoms towards the bank which lies to the westward. Bottle islands should not be approached within a mile, the bottom being uneven, and there being a dangerous rock (Calcutta rock) lying three-quarters of a mile to the south-west of the outer islet. When about 4 miles to the southward of Bottle islets, the coast may be approached to within half a mile, but in standing to the westward vessels should not shoal less than 4 fathoms, and Pulo Anza should not be brought to bear northward of N.W. Should a vessel, however, ground here no damage can be sustained, the banks being of soft mud and the water invariably smooth.

From the Southward.—When Parcelar hill bears E. ½ N. the entrance of Colong strait may be easily discerned, the several points appearing as bluffs, the most southerly of which is Lumaut point, which is three-quarters of a mile from the entrance of Colong strait. Caution is required in approaching Lumaut strait on account of the strong tides which set into it; caution is also required in steering for Colong strait not to get set to the westward of the south end of Pulo Colong, as a dry bank extends to the westward with deep water close to its edge. The best time for entering is near the time of high water.

Tides.—The flood stream runs through the middle of the strait until it is nearly half ebb by the shore, and this is generally the case in most parts of Malacca strait.

KLANG RIVER.—The entrance of this river is situated at the north-east bend of Lumaut strait, and is in lat. 2° 59½ N., long. 101° 21½ E. The river runs from a distance of 30 or 40 miles in the interior, and its banks are high and covered with mangroves and various sorts of palms. It is 2 to 4 cables broad, and free from danger for about 11 miles from the entrance, the least water found being 9 feet (low water). Vessels

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drawing 8½ feet can proceed for a distance of 12 miles beyond Klang. The soundings are irregular.

On approaching the entrance of Klang river from the westward, keep in mid channel till near the police station, pass the latter close to, so as to avoid a spit which projects from the north entrance point of the river. Having entered the river, keep mid channel and follow the general rule of keeping in the bends and avoiding the points. At low water great care is necessary in the last two or three bends before arriving at Klang, as the channel is narrow and the bends sharp. Anchor abreast the fort in 2 to 3 fathoms mud, and close to the right bank.*

The village of Klang is situated at about 12 miles from the entrance of the river, and is defended by a fort and three stockades; there are also two stockades at the entrance and two below Klang village; the fort and all the stockades are on small eminences, the left-hand stockades commanding the whole. There are about 20,000 Chinese in the interior working the tin mines, the tin being brought down in boats, which take a return cargo of rice.† Supplies are scarce.

Tides.—It is high water, full and change, at 6h., springs rise 15 feet, neaps 12 feet.

Off the mouth of Klang river the tidal streams run 6 hours each way, and turn 1½ hours after high and low water. It is high water at about one hour later at Klang village than at the mouth of the river.‡

LANGAT RIVER has two mouths, one of which opens into Lumaut strait, the other (the Jugru) into the sea to the south-west of Parcelar hill. H.M.S. *Teazer* in 1871, drawing 8½ feet, proceeded through the Lumaut mouth to the village of Langat, 25 miles from the entrance. At about 1½ miles inside the entrance of the river, and extending nearly across, is a sandbank having only 2 feet at low water; the deepest water is very close to the banks on either side. With the exception of this bank, the shoalest water found was 9 feet (low water). The *Teazer* moored opposite the Sultan's palace, a Malay intrenchment having a few guns, and had room to swing only in one direction. The Sultan of Langat derives a large income from the tin which is brought from the interior.

Vessels should anchor a little below the town of Langat, so as to be clear of the tidal influence of Jugru river.

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* Directions for Klang river by Sub-Lieutenant L. F. C. Jackson, H.M.S. *Sheldrake*, 1876.

† Remarks by Sub-Lieutenant H. B. Warren and Navigating Sub-Lieutenant J. S. Barrett, H.M.S. *Teazer*, 1871.

‡ Commander A. T. Powlett, R.N., H.M.S. *Avon*, 1874.

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H.M.S. *Midge* in 1874, drawing 8½ feet, also proceeded to Langat. Navigating Sub-Lieutenant G. F. Whitmore remarks: "In proceeding up and down Langat river we hugged the bank very closely, always avoiding the points, and crossing to the opposite shore when necessary; the turnings are very sharp and numerous, and a longer vessel, or one with a single screw, would not be able to proceed to the anchorage off the town." A good look-out should be kept for snags. The services of a pilot are necessary.

Jugru river.—From Langat village Commander R. H. Blomfield, H.M.S. *Teazer*, 1871, proceeded in a boat down a rapid stream, full of dangerous snags, into Jugru river, which leads to the foot of Parcelar hill, and eventually to the sea south-west of the hill. This river is said to have 3 feet on the bar at low water, 6 or 7 fathoms inside the entrance, and 3 to 6 fathoms as far up as the hill, but owing to the snags and windings of the river is only safe for steam launches. The river is becoming wider and deeper every year. The distance of Langat village from the sea by the Jugru is 7 miles.

The entrance of Jugru river is scarcely perceptible from seaward except by several beacons which have lately been placed by the natives to mark the river's mouth. The edge of the bank off the mouth of the river is steep-to and should therefore be approached with caution.

Tides.—It is high water, full and change, in Langat river at 6h.; springs rise 15 feet, neaps 12 feet. In Jugru river the rise and fall is about 8 feet.

PARCELAR HILL, or BUKIT JUGRU, at about 4 miles distant from the nearest part of the coast, is, when seen to the eastward or westward, of an oblong shape sloping at both ends, but when viewed from the southward it appears conical. It is thickly wooded, isolated, and is the only hill standing near the sea coast; it is easily known, and in clear weather may be seen from a distance of 35 miles.

The coast from the entrance of Lumaut strait takes an easterly direction to Parcelar hill and the south-west entrance of Langat river; thence trends gradually to the south-east to Parcelar point, which in lat. 2° 41′ N. The bight fronting Parcelar hill is filled by a shoal bank extending from Lumaut point to Parcelar point. The bank is composed of fine hard black sand, like steel filings, and should be approached with caution as it is steep to, the water shoaling suddenly from 15 or 10 fathoms to 3 fathoms.

Parcelar point, in lat. 2° 41′ N., being round and similar to the adjacent coast, is not easily distinguished, but a little eastward of the point there is a white beach or patch on the shore which may be discerned when

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the point is bearing to the northward, and the observer not too far off the land.* The point may be approached within a quarter of a mile, there being 15 fathoms at that distance.

From Parcelar point the coast takes an E.S.E. direction to a point situated 2 miles to the westward of the entrance of Sappan river, which is said to be navigable for vessels of 5 feet draught; thence E. by S. to the entrance of Lukut river; thence south to Tanjong Kamuning, thus forming between the latter and the point westward of Sappan river a bay $2\frac{1}{2}$ miles deep and 7 miles across. This bay is almost filled by a bank on which there is 6 to 12 feet water.

The whole of the coast from Parcelar point to Sappan river is low, thickly wooded, and skirted by a sand-bank which extends half a mile to a mile seaward.

Lukut river, it is said, may be entered at high water springs by vessels drawing 9 feet; steam launches can ascend about 5 miles, as far as the house of Rajah Bott. At the mouth of the river is a small village, the inhabitants of which carry on a trade with the Bughes boatmen, who exchange grain, &c. for the tin which is brought down from the adjacent hills. Although no villages or huts are to be seen on the coast, yet it is inhabited by fishermen who apparently live a short distance from the beach, for smoke may constantly be seen rising all along the coast. There are two good fresh-water streams in the bay on the right side of the entrance of Lukut river.

A mile north of Tanjong Kamuning is Pulo Burong, a small islet skirted by rocks and surrounded by shoal water. Half a mile south of Tanjong Kamuning is Pulo Arrang Arrang, a similar island skirted by rocks and standing on a shoal bank.

BAMBEK SHOAL.—The centre or dry patch is in lat. 2° 33′ N., long. 101° $37\frac{1}{4}$′ E. in a direct line S.E. $\frac{1}{2}$ E., between Parcelar point and cape Rachada, and nearly equidistant from both points; from the nearest part of the mainland Bambek shoal is distant 3 miles. The shoal is composed of hard sand and within a depth of 18 feet is 2 miles long in a N.W. by W. and S. E. by E. direction, and 7 cables broad; it is steep-to, the water deepening suddenly to 8 or 10 fathoms within a cable. Between Bambek shoal and the nearest part of the shore to the north-east is a small bank of $3\frac{1}{2}$ fathoms to 10 fathoms irregular soundings, and between this bank and the shore there is a channel $1\frac{1}{4}$ miles wide and having 12 to 29 fathoms sand and mud.

To the westward of the north-west extremity of Bambek shoal are two banks of 8 and 10 fathoms, distant from the dry patch $2\frac{1}{2}$ and $5\frac{1}{2}$ miles respectively. Vessels should not bring cape Rachada lighthouse to bear

* There is also a white patch about 5 miles more to the eastward.

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southward of S.E. by E. ¼ E. to ensure passing to the southward of Bambek shoal.

Four miles E. ½ S. from the dry part of Bambek shoal is the north-west extreme of a sand bank a half to a mile wide, which extends nearly as far as cape Rachada; the bank is 9 miles long, has a dry patch nearly in the centre, and has from 2 to 5 fathoms water. Between the bank and the shore there is a passage a half or a mile wide, and having 5 to 19 fathoms water.

Cape RACHADA, or TANJONG TUAN, is a steep bluff point, covered with trees, and easily distinguished, as it is higher than the adjacent coast, and appears when first seen in the distance like an island. Vessels may boldly approach the cape, there being deep water a quarter of a mile distant, and 20 to 40 fathoms, sandy bottom, within a mile; but to the northward of the cape vessels should not approach the shore within 3 miles on account of the sand-bank just mentioned. Near the cape there are two fresh-water wells.

From cape Rachada the low woody coast of Sumatra, distant 20 miles, may be seen, the strait being here more contracted than at any other part north of Malacca.

Tides.—Off cape Rachada the flood sets to the southward, the ebb to the northward; both streams are very strong and pass the cape in noisy ripplings.

LIGHT.—On cape Rachada stands a round tower painted white, 78 feet high, which exhibits at an elevation of 446 feet above the level of the sea, a fixed *white* light visible from seaward between the bearings of S.E. by E. and N.W. by W. In clear weather the light should be seen from a distance of 26 miles. The line of the northern limit of the light passes over the centre of Bambek shoal, and half a mile south-west of Diana rock.

ARROA ISLANDS are a group of small islands lying nearly mid-channel between Sumatra coast and the North Sands; they occupy a space of 8¾ miles N. by W. ½ W. and S. by E. ½ E., and the same space east and west. These islands are situated on a bank of sounding of 6 to 10 fathoms, the northern end of which extends 6 miles to the north-west, and the southern joins an extensive mud bank adjacent to the Sumatra shore; Arroa bank is steep to the northward, eastward, and westward, the soundings suddenly increasing to 18 and 20 fathoms.

North rock, lat. 2° 55¼′ N., long. 100° 33½′ E., is small of a considerable height, and has a reef surrounding it; there are regular soundings of 6 and 7 fathoms near it.

Long (or Great) Arroa, or Pulo Jummoor, is an islet lying 2¾ miles S.W. ½ S. from North rock; it is about two thirds of a mile long, 400 yards broad, flat, covered with trees, and surrounded by rocks. At 2 cables to the north-east of Long Arroa are two small islets nearly

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joined and having a reef of rocks which extends three-quarters of a mile to the north-east. A bank of 4 fathoms extends 1¼ miles N. by W. from Long Arroa. Between North rock and the islets of Long Arroa the soundings are from 7 to 15 fathoms.

Malay fishermen sometimes visit Long Arroa to fish and procure turtle; boats landing here ought therefore to be on their guard. There is a small spring of fresh water in Long Arroa, but not sufficiently large to water a vessel from. In the rainy season, in the months of October to January, an abundance of water may be found, there being in the island several natural tanks which dry in the hot season. The best watering place is on the western side, there being no rocks on that side,* and a vessel may anchor close to the island in 6 or 8 fathoms mud, with the highest part of the island being North.

Western Arroa, or group of islets, three-quarters of a mile to the westward of Long Arroa, are five in number, namely, Tookong Mass, Pulo Rendang, Paseer Panjang, Labuan Biti, Tookong Chama, and occupy a space of 1½ miles in a N.N.W. and S.S.E. direction by 3 cables in breadth; they are all connected by a reef which is nearly dry at low water and extends half a mile N.N.W. of the northernmost island. Between Long Arroa and Western Arroa there is a channel of 7 to 16 fathoms.

Battoo Balia is a group of six rocks surrounded by a circular reef which is half a mile in diameter; they lie E. ½ S. 3¼ miles from Long Arroa and are separated from that island by a channel having 6 to 8 fathoms water.

A rock which covers at half tide lies East of Battoo Balia 1¾ miles distant, and has 17 fathoms close-to.

East Rock, or Battoo Mandie, lying E. ¼ S., 6¾ miles from the south end of Long Arroa, is low, flat, and black; there are 16 or 18 fathoms water within a cable.

Round Arroa or **Tookong Simbang,** lat. 2° 48½′ N., long. 100° 36¼′ E., is the highest of the group of Arroa; its summit is covered with trees and may be seen from a distance of 15 miles. There are several rocky islets near it, two of which are visible 12 miles. Round Arroa with its outlying islets occupy a space of 1¾ miles north and south, and three-quarters of a mile east and west; the southern islet is named Pulo Tookong. From Round Arroa, East rock bears N.N.E. ½ E. distant 4¼ miles; there is a channel between having 7 and 8 fathoms water.

Tides.—The tides at Arroa islands are very irregular, especially during neaps when there appears to be a constant current setting to the north-west, slacking only towards the time of high water; although the

* The surveying vessel *Krishna* filled her tanks in the month of January in one day, the natives affording every assistance. The *Krishna* returned to the island in the month of March, but found it dry, with the exception of the small spring.

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direction and duration of the tides are so irregular, there is still a regular rise and fall of 14 feet at springs and 9 feet at neaps.

Caution.—Much care is requisite in approaching Arroa islands during the night as they are low, and difficult to see after dark. In working into the strait it is never advisable to approach these islands closely as the tides are so irregular.

NORTH SANDS comprise various sand-banks and spits extending from the Malay coast between Salangore river and Parcelar hill towards Arroa islands. The sand-banks have a general N.W. and S.E. direction, and have channels of 6 to 20 fathoms water between them. The north-west extremity of the sands is in lat. 3° 14′ N., long. 100° 50′ E.; a narrow strip of sandbank, having one foot to 7 fathoms, and divided near the centre, extends thence in a south-easterly direction a distance of 12 miles; the southern half of this shoal is called Battoo Kinching, and has a dry spot about a mile from its southern end. All these banks and patches are usually visible during daylight. The principal dangers are Blenheim shoal and One-fathom bank.*

Bleinheim Shoal, having 4 feet least water, is $1\frac{3}{4}$ miles long in a N.W. and S.E. direction. The shoalest part is in lat. 3° 3′ N. long. 100° 54$\frac{3}{4}$′ E., near the centre of the south-west side of the shoal. Parcelar hill, bearing E.S.E., leads to the south-west of the shoal which is distant 32 miles from the hill.

A small patch of $4\frac{3}{4}$ fathoms lies West $3\frac{1}{4}$ miles from Blenheim shoal.

Two miles N.E. by E. from the shoalest part of Blenheim shoal is a bank a mile long N.W. and S.E., and having 15 to 21 feet water. Eastward also of Blenheim shoal, distant 8 miles, is another bank 3 miles long in a N.W. and S.E. direction, and 7 feet least water.

ONE-FATHOM BANK is the most prominent danger on the North sands; it extends 2 miles in a N.W. and S.E. direction, is nearly a mile broad, and has 6 to 16 feet water. Its shoalest part is in lat. 2° 52$\frac{1}{2}$′ N., long. 100° 57′ $\frac{1}{4}$ E., and bears S. by E. $\frac{1}{4}$ E., 11 miles from Blenheim shoal. Parcelar hill bearing E. $\frac{1}{4}$ S. leads to the southward of One-fathom bank. Westward and eastward of One-fathom the soundings deepen quickly to 10 and 13 fathoms. North-westward the bank extends 8 miles, and has 4 to 8 fathoms.

LIGHT.—An iron screw-pile light tower, painted in belts of red and slate colour, is situated on One-fathom bank in 15 feet water about half a mile to the eastward of the shoalest part of the bank. From the tower is exhibited a *revolving* white light, which attains its greatest brilliancy *every minute;* it is elevated 61 feet above the level of the sea, and in clear weather should be visible from a distance of 13 miles.

* *See* Admiralty chart: North and South Sands, Malacca Strait, Nos. 794*a* and 794*b*.

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Buoy.—A red buoy is moored in 14 feet at the north end of One-fathom bank.

A small patch of 21 feet lies N. ½ E. 4¼ miles from One-fathom bank lighthouse, and another in line between Blenheim shoal and One-fathom bank lighthouse, 6½ miles from the lighthouse. Lying nearly parallel to One-fathom bank, at a distance of 4½ miles, is a bank of 8 to 10 fathoms water 6 miles long and half a mile broad.

A patch of 3½ fathoms about 3 cables in extent lies S.W. ¾ W., 7¾ miles from One-fathom lighthouse.

Channels.—There is a deep channel between the bank which extends from Pulo Colong and the eastern side of North Sands, but unless it were buoyed it would be dangerous for large vessels to use it, as no bearings can be given to direct them. Coasting vessels use this channel, keeping on the edge of Pulo Colong bank in 4 and 5 fathoms.

The channel between the north-west extreme of North Sands and Arroa islands is deep, there being from 20 to 60 fathoms mud, the soundings decreasing as the islands are brought to bear West. The deep water extends to within 5 miles of North rock, but close to East rock. A bank of 10 fathoms lies E.N.E., distant 6¼ miles from East rock.

SOUTH SANDS are of similar formation to North sands, and extend across to the Sumatra coast. There are several extensive dry banks between the part at present surveyed and the Sumatra shore, along which, in this neighbourhood, there are narrow and intricate channels. Native boats invariably cross the South sands about 10 miles south of Parcelar hill. The neighbourhood of South Sands may be considered as the most dangerous part of Malacca strait, there being no near objects from which bearings can be given to clear the numerous dangers.

The eastern edge of South Sands forming the western side of the navigable channel through Malacca strait extend in a chain from a position 7 miles south of One-fathom bank (North Sands) in an E.S.E. direction 38 miles, and are distant from the Malay coast 12 or 15 miles.* The northern shoal head, of 2¾ fathoms, lies 10½ miles S. by E. ½ E. from One-fathom bank lighthouse. In a distance of 6 miles to the north-west of the shoal the sounding vary from 5 to 10 fathoms.

Pyramid Shoal, the easternmost of the South Sands is the most dangerous, being separated from the others a distance of 4 miles. Within a depth of 4 fathoms the shoal is 1¼ miles long in a N.W. and S.E. direction half a mile broad, and has 6 feet least water; the bottom is hard sand. From Pyramid shoal Parcelar hill bears N. ¾ W., distant 23 miles, and cape Rachada lighthouse E. ½ S., 21½ miles. Bambek shoal bears N.E. by E., distant 12 miles from Pyramid shoal.

* The eastern edge of South Sands is said to have extended about one mile farther east than is shown on the present charts.—1877.

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DIRECTIONS.—Vessels, after passing One-fathom bank, should steer to the eastward, as they may approach the land with safety within 4 or 5 miles. In working to windward they should not stand farther off the coast than 10 miles, nor nearer in shore than 3 miles. The soundings near the sands are so irregular that they afford no guide as to the proximity of those dangers. Vessels therefore should approach with care.

Tides.—It is high water full, and change, from 5h. 30m. at the head of the North sands, to 6h. at One-fathom bank and on the South sands. During springs the tides are regular running N.W. and S.E. on the North sands; W.N.W. and E.S.E. on the South sands at the rate of 3 to 3½ miles an hour, and run from two to three hours after the time of high and of low water. During neaps the tides are weak and irregular. Springs rise 15 feet, neaps 9 feet.

The coast from cape Rachada takes an easterly direction to the entrance of Lingey river, then south-easterly to Tanjong Kling. The coast forms three large bights in this space; it is rocky and irregular, formed by rocky points having small bays between, and skirted by a mud flat, which extends in some places a mile from the shore; there are several detached rocks which will be described.

Pulo Pajuda is a small islet lying about a quarter of a mile from the shore, 2½ miles eastward of cape Rachada; it stands on the mud-bank which skirts the shore.

LINGEY RIVER.—The entrance of this river is situated 7 miles to the eastward of cape Rachada. The bar, which has rocks on either side, has a depth of 12 feet at high water springs, and 9½ feet at high water neaps. The river is navigable for vessels of 8 feet draught as far as Sempang, 10 miles from the mouth: it should not be attempted without a pilot; a pilot may be shipped at Malacca.* At Sempang the river divides into two branches, one having a northerly direction and the other an easterly direction; the north branch is navigable for large boats a distance of 4 or 5 miles; the east branch is too narrow for rowing boats.

Tides.—At Sempang, where the water is quite fresh, springs rise 9 feet.

Two miles to the north-west of the entrance of Lingey river is a hill named Bukit Salamat.

Lingey river forms the western boundary of the British possession of Malacca.

Battoo Mandi is a rock awash off the entrance of Lingey river, and one mile distant from the shore; a buoy is moored on the east side of the rock.

Battoo Tinga, or three rocks, are just above water, 2 miles E.S.E. from Batto Mandi.

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* Commander A. T. Powlett, R.N., H.M.S. *Avon*, 1874.

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DIANA ROCK is a large rock always above water, a mile from the shore; it lies S.E. by E. ½ E., distant nearly 16 miles from cape Rachada lighthouse, which light is obscured when the vessel approaches within half a mile of the rock. Inshore of Diana rock there are several other rocks and a sandy ridge of 3½ to 5 fathoms, lies one to 2½ miles north-west of the rock.

A shoal head of 2 feet lies S.E. ¼ E., 1¼ miles from Diana rock, and S.W. by W. ¼ W., one mile from Tanjong Panchoo. Off this cape also lie several islets within half a mile from the shore.

RALEIGH SHOAL, of 3½ fathoms, is about half a mile long, north and south, and lies S. ¾ E., 18 miles from cape Rachada; S.W. ¼ W. 14½ miles from Diana rock, and W.S.W. 17 miles from Tanjong Kling. The shoal is steep on its north side, on its other sides 4½ and 5 fathoms will be found within half a mile. There is a deep passage between Raleigh shoal and Pulo Ruput (adjoining Sumatra shore), 9 miles distant, the soundings varying from 20 to 45 fathoms. Between Raleigh shoal and the Malay coast, the soundings are from 20 to 30 fathoms.

TANJONG KLING, situated 22 miles S.E. ¼ E. from cape Rachada, is a low projecting point of land covered with high jungle and easily seen; it is the north-west boundary of Malacca bay, and may be approached to half a mile.

Fisher islet, 2¾ miles to the westward of Malacca town, and 1¼ miles from the shore, is about a quarter of a mile in extent, and situated on the mud bank which skirts the adjacent shore; the islet is red, of moderate height, its top covered with trees and easily discerned. There are 5 to 10 fathoms water within a quarter of a mile of the south-west side of Fisher islet. At night vessels should not shoal less than 15 fathoms in approaching this islet. Midway between it and the shore there is another islet.*

MALACCA.—This town is built on either side of a small river of that name, and is the seat of government of the British settlement of Malacca. The country a few miles inland of Malacca is formed of undulating hills, moderately elevated, called Malacca hills, and 20 miles E.N.E. of them is Goonong Ledang or Mount Ophir, having a triple peak, 3,840 feet high; the coast and land adjacent to the town are low and wooded.

On the left bank of the river rises the verdant hill of St. Paul, surrounded by vestiges of an old Portuguese fort. Around the base of the hill lie the barracks, lines, and most of the houses of the military, the stadthouse, courthouse, gaol, church, hospitals, convent, police office,

* Navigating Sub-Lieutenant W. T. Thompson, H.M.S. *Avon*, 1874, states that this island does not exist, there being a narrow channel of 4 feet water between Fisher islet and the shore.

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school, post office, and master attendant's office. On the summit of the hill stand the ruins of the ancient church of Our Lady del Monte, erected by Albuquerque, and the scene of the labours of St. Francis Xavier; also the lighthouse and flagstaff. A little to the south rises the hill of St. John's, and in the rear of the latter that of St. Francis; on these eminences are the remains of batteries erected by the Portuguese and Dutch; smaller knolls intervene covered with extensive Chinese cemetries.

The larger part of the town, including the bazaars, are situated on the right bank of the river. The principal public institution in Malacca is the Anglo-Chinese college, established in 1818 for the instruction chiefly of Chinese and Malays; there are also many schools for Chinese and Hindoos.

Population.—The population of the settlement of Malacca in 1871 was as follows: Europeans, 47; Malays, 57,474; Chinese, 13,456; natives of Hindostan, 3,000. The town is reported to be healthy.

Trade.—The chief exports comprise tin, sugar, pepper, nutmegs, mace, sago, rice, buffalo hides, and horns, rattans, gutta, gum, coffee, and opium. The united value of the exports and imports of Malacca in 1873 was 776,731*l.*

Supplies.—Malacca is convenient for vessels requiring water and supplies. Water is obtained on application to the master attendant; and fish, yams, grain, sago, and a variety of fruits may be obtained at moderate prices; also poultry, hogs, buffaloes. Poon spars from Siak river suitable for masts may be procured.

LIGHTS.—On the summit of St. Paul hill is a turret which exhibits at an elevation of 146 feet above the level of the sea a *fixed* white light, visible in clear weather from a distance of 12 miles.

From the pier head at Malacca is exhibited a fixed *red* light, visible from a distance of 6 miles.

River.—The entrance to Malacca river is nearly dry at low water, being obstructed by a bank of soft mud, which extends 1¼ miles from the shore, and has 18 feet on its outer edge. The river is spanned by several bridges, and a pier extends seaward from the entrance a quarter of a mile. Boats can enter the river soon after a quarter flood. They should steer for the church on the hill, keeping it a little on the starboard bow, and when the bar is approached the channel may be discovered by the stakes at the entrance of the river. A small boat can with difficulty go alongside the pier at low water.

Pulo Java, or Red island, is composed of two islets separated by a narrow space, the inner islet lies three quarters of a mile to the south-east of the entrance of the river, the two occupy a space of 4 cables in a north-west and south-east direction, and are surrounded by shoal water.

Pulo Panjang, a narrow rocky flat, lies S. by E. ½ E., 2 miles from the flagstaff at Malacca, and one mile from the nearest part of the shore;

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it is about half a mile long in a W.N.W. and E.S.E. direction, and steep on its south side, there being 8 to 19 fathoms within a quarter of a mile, but on the other side the water is shoal. Pulo Panjang is marked by three white stone beacons, each surmounted by a diamond top, namely, one at the north extreme, one at the west extreme, and the other at the east extreme of the islet.

Between Pulo Panjang and Pulo Java, and situated on the edge of the bank which skirts the coast, lies a small islet.

DIRECTIONS.—Malacca road is included in the space lying seaward of a line joining Fisher islet and Pulo Panjang, and is a safe anchorage; it is neither visited by the hurricanes of higher latitudes, nor is it within the influence of the monsoons of the adjacent seas. In approaching from seaward, the first objects that strike the eye are a cluster of trees crowning the summit of St. Francis hill, the star fort of St. John's to the south, the lighthouse and ruinous church on St. Paul's, and the white edifices which skirting its base, and extending along the seashore, are gradually lost in the thick groves of cocoanut trees which cover the dwellings of the Chinese and Malays. In the background of this pleasing view rise the hills of Bukit Bertam, &c., and in the distance the triple peak of Mount Ophir already mentioned.

Vessels approaching from the southward at night should steer well clear of the outer Water island as the flood tide sets towards the island. After rounding Water islands, which extend 5½ miles off shore, care should be taken not to approach Pulo Panjang too closely, as it is steep-to; this reef is marked, as already mentioned, by three white stone beacons.

The best anchorage in Malacca road is in 8 fathoms near the weirs, with the fort bearing N.E., about 2 miles off shore, or with Pulo Anjote and Pulo Undan (Water islands) in line S.E. ¼ S. The soundings deepen quickly to 7 and 8 fathoms outside the coast bank. Under a depth of 10 fathoms the bottom is chiefly of mud; exceeding that depth it is a stiff tenacious clay. On the east side of the road the bottom is rocky.

The sea-worm in this road is very destructive to vessels or boats not having copper sheathing.

Tides.—It is high water, full and change, in Malacca road at 7h. 30m.; springs rise 11 feet, neaps 8½ feet. The tidal streams have a rate of 2 knots, and continue to run two or three hours after high and low water respectively.

Winds.—During the period of the south-west monsoon in the China sea, sudden hard squalls frequently blow into the road from the Sumatra side in the night, accompanied with lightning, thunder, and rain. These winds, called "Sumatras," generally commence to blow at seven or eight in the evening, and attain their greatest strength at midnight.

WATER ISLANDS are a group of six, lying to the south-east of Malacca. Pulo Anjote and Pulo Undan, the two outer islands, lie

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S.S.E. ½ E. and S.S.E. ¾ E., distant 7½ miles and 10 miles respectively from Malacca lighthouse, and 4¾ and 5½ miles respectively from the nearest part of the shore. The islands are of moderate height, round, and covered with trees. In shore of the largest Pulo Bessar, the bottom is foul and rocky, but between the others there are good channels of 10 to 20 fathoms water. West of Pulo Bessar, half a mile distant, there is a small island named Pulo Srinbong. A shoal of 12 to 18 feet water extends a mile to the north and north-west of Pulo Bessar, and between the latter island and Pulo Srinbong. The channel between Pulo Dodole and Pulo Bessar has a dangerous rock with only 9 feet water, nearly mid-channel. The channel between Pulo Undan and Pulo Nanka (next north) is 1¼ miles wide.

Water.—On Pulo Bessar there are said to be several springs of good water, some of them in the form of wells, enclosed with bricks.

ROB ROY BANK lies nearer to the Sumatra side of the channel, and is, within a depth of 5½ fathoms, about 7 miles long in a N.W. by W. and S.E. by E. direction. The shoalest spot has 6 feet water and lies S.W. by W. ¼ W., 17 miles from Pulo Undan (the outer Water island) and S. by W. ¼ W., 19 miles from Tanjong Kling. Shoals heads of 9 to 17 feet extend thence 3¼ miles in a north-westerly direction, deepening to 5 and 5½ fathoms in a distance of 2½ miles, and then to 12 and 14 fathoms. There is a depth of 14 fathoms 1½ miles to the south-east of the 6-feet patch, and 30 fathoms a mile to the eastward.

The outer edge of an extensive mud bank which skirts the shore of Pulo Bucalisse approaches within 4 miles of the south-west side of Rob Roy bank.

A shoal head of 4½ fathoms lies 8 miles S.E. by E. ¾ E. from the 6-feet patch on Rob Roy bank, and 14½ miles S.S.W. ½ W. from Pulo Undan. This head is near the centre of a narrow ridge 5¾ miles long in a N.W. by W. and S.E. by E. direction, and having 5 to 8 fathoms water. 10 to 15 fathoms water will be found 11 miles to the south-east of the ridge, and 13 fathoms 2 miles to the north-west.

The coast from Malacca to Tanjong Seginting off mount Formosa is low, thickly wooded, and forms two bays about 4½ and 2½ miles deep; it has a general S.E. by E. direction, and is skirted by a mud bank which extends in some places 2½ miles off shore, and westward of the river Moar to 4 miles from the shore.

Moar river.—The entrance to this river is in the depth of the bight formed between the point adjacent to Water islands and Tanjong Tor, and is the eastern boundary of the settlement of Malacca; it is narrow at the entrance, and on account of the shallow flat which extends off its mouth, is only navigable by small vessels. The river, inside, is deep and wide.

Bukit Moar is an isolated thickly wooded hill in lat. 1° 59′ N., and 3 miles from the sea shore; it is visible from Malacca road.

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Tanjong Tor is a low projecting point of land, covered with jungle, and dividing the two bays just mentioned. It is useful as a mark for clearing Formosa bank.

Formosa river, or Songey Battoo Pahat, is similar to Moar river, that is it has a shallow flat, having one foot at low water, and extending 3 miles off its mouth. The river, inside, is deep.

Tides.—It is high water, full and change, at Formosa river at 8h. 30m.; springs rise 11 feet, neaps 8½ feet.

MOUNT FORMOSA, 1,480 feet high, is the summit of a small range of undulating hills, which terminate at Tanjong Seginting, and is visible from a considerable distance.

Shoal water extends a distance of 2¼ miles westward of Tanjong Seginting, and there is a small island lying within a cable of the shore north of the point.

Formosa bank, lying off Tanjong Seginting, is a dangerous shoal 4 miles long in a N.W. by W. and S.E. by E. direction, 3 cables broad, and having 12 to 23 feet water bottom hard black sand. The east end of Formosa bank bears from Bukit Moar S.E. ¾ S., and from mount Formosa S.W. ¾ W., 3 miles from the nearest part of the shore. A depth of 4½ fathoms will be found 2½ miles to the eastward of the east extremity; a ridge of 5 to 10 fathoms water extends 7 miles to the north-west of the west extremity.*

The COAST from mount Formosa to Tanjong Bolus is low and thickly wooded, and abreast Pulo Pisang forms a bight 3 miles deep; it is lined by a shallow mud-bank which extends one or 2 miles from the shore except between Pulo Pisang and Pulo Cocob where it extends nearly 6 miles from the shore. Several small rivulets empty themselves into the sea in this tract of coast. Inside of a line, N.W. ¼ W. and S.E. ¼ E., joining Tanjong Seginting and the outer islets of Pulo Pisang, the bottom is uneven, many casts of 3½ and 4 fathoms with 6 and 8 fathoms close-to, being found, vessels therefore should keep outside the line.

Tides.—It is high water, full and change, from 8h. 30m. off mount Formosa to 9h. 30m. off Tanjong Bolus; springs rise 10 or 11 feet, neaps 6 or 7 feet; the streams run two or three hours after high and low water.

PULO PISANG, lat. 1° 29′ N., long. 103° 11′ E., is a mile long., E.N.E. and W.S.W. half a mile broad, and covered with trees. The island is formed of three hummocks, the central and highest one being 200 feet high, and may be seen from a distance of 20 miles. A lighthouse is in course of erection on Pulo Pisang.

* A small patch of 9 feet is said to exist E.S.E. of Formosa bank; and though this patch could not be found during the survey, it is considered that it may possibly exist, as these pyramidal-shaped patches are difficult to find.—*Horsburgh's Directory*, vol. 2, 8th edition, p. 132.

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Between Pulo Pisang and the adjacent coast, which is 7 miles distant, the fringing mud-flat is almost continuous; and a spit, half a mile to a mile wide, steep and having 4 to 18 feet water, extends 5 miles in a S.E. by S. direction from Pulo Pisang. On the north-east edge of this spit is situated a small islet, and three-quarters of a mile West of Pulo Pisang are two small islets lying close together and having 5½ to 14 fathoms water close to their westernside: fresh water may sometimes be procured on the larger of these two islets. A bank having 3 to 4 fathoms water extends 4½ miles to the north-west from the north-west side of Pulo Pisang.

Tides.—It is high water, full and change, at Pulo Pisang at 9h.

Pulo Cocob is a low flat wooded island 2 miles long., in a N.W. and S.E. direction, and 1½ miles broad; it lies 11½ miles S.E. ¼ E. from Pulo Pisang, and is separated from the coast by a narrow creek or boat channel. The trees on the north-west side are of a bright green color, and resembling grass; at the south-east end they are tall erect poon trees, like those on the adjoining coast. At low water the island is surrounded by a dry sand-bank which extends off the north-west extreme 1½ miles. Vessels in passing may approach to within three-quarters of a mile.

Tanjong Bolus or Booro, the south point of Malay peninsula, is a broad semicircular tongue of low land having high trees on its western side and low bright green mangroves to the eastward. All the adjacent country is low with the exception of Goonong Pulai or Pontiana, an isolated mountain 2,150 feet high, situated 19 miles to the northward of the point.

A mud-bank, steep-to on its outer edge, extends between Pulo Cocob and Tanjong Bolus, and projects about 1½ miles from the shore.

Between Tanjong Bolus and Little Carimon island, Malacca strait is 9¼ miles wide and has from 18 to 20 fathoms water.

Fair Channel Bank.—A bank of 4¾ fathoms lies 6½ miles west of Pulo Pisang: this bank lies on a long narrow ridge of soundings of 6 to 11 fathoms and which extends nearly parallel with the coast as far as Formosa bank, and is steep-to.

Long Bank.—At a distance of 18 miles S. by W. from mount Formosa and 22½ miles W. ¾ N. from Pulo Pisang lies the north end of a bank which extends 17 miles in a S.E. ½ E. direction, and has 16 to 30 feet water. This bank is steep-to and continues to the north-west 9 miles, with depths of 5½ to 11 fathoms, and to the south-east joins the Great Carimon group. The ship channel lies between Fair Channel and Long banks, which are from 6 to 7 miles apart.

Westward of the bank last described are numerous banks similiar to Fair Channel and Long banks, and extending to within a short distance of the fringing banks on the Sumatra side of the strait. It would be perplexing to the seaman to give any further description of these banks, the best idea of them is to be gained by studying the chart.

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CHAPTER II.

SINGAPORE STRAIT.

VARIATION 1° 30′ East, in 1878.

GENERAL DESCRIPTION.—Singapore strait is bounded on the north by the Malay peninsula and Singapore island, and on the south by the Boelang archipelago, and the large islands of Batam and Bintang. The entire length of the strait is about 60 miles. Its breadth, at the western entrance between Little Carimon island on the south side and Tanjong Bolus on the north is about 10 miles, the main channel of the strait, between the Rabbit and Coney, and the islands to the southward, is barely 3 miles wide, and the eastern entrance, between Tanjong Brakit on Bintang island and Romania point on the Malay peninsula, is 20 miles broad.*

Owing to the many dangers in Singapore strait, its navigation was formerly attended with much difficulty and anxiety, but such has ceased to be the case since the erection, in 1851, of Raffles lighthouse upon Coney island, and Horsburgh on Pedra Branca rock, in the middle of the eastern entrance. These are well situated, so that with common attention the strait can now be navigated either by day or by night, without risk or delay.

For the sake of convenient reference it has been thought best, in describing this strait, to divide it into four portions, viz., Singapore strait, western part; Singapore New harbour, town and roads; Singapore strait, eastern part; and Old strait of Singapore. The western part to comprise a description of the strait from its western entrance to Singapore roads, and the eastern part, from Singapore roads to its eastern entrance.

SOUTH SHORE OF WESTERN PART OF THE STRAIT.

TREE ISLANDS, or Pulo Angup, situated about 10 miles within the western entrance of Singapore strait, are the north-western-

* *See* Admiralty charts:—Singapore strait, No. 2,403, scale, $m = 0{\cdot}66$ inch; Banka strait to Singapore, No. 2,757, scale, $m = 0{\cdot}15$ inch; China sea, No. 2,660A, scale, $m = 0{\cdot}05$ inch; and plan of Singapore Main strait, No. 2,404, scale $m = 0{\cdot}1$ inch.

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most of the islands and dangers which extend about 5 miles in a south-easterly and north-westerly direction, and limit the southern side of Singapore Main strait. They are two small islets, or rather clumps of trees, lying N.W. and S.E. of each other, about half a mile apart, on a bank of rocks and sand, very little elevated above the sea at high water. From the southern edge of the bank Red island bears E. by S. ½ S., distant 2¾ miles, and from its north-western edge, which is awash at high water, Raffles lighthouse bears E. ⅛ N., nearly 5½ miles. The reef extends about a third of a mile northward of the north-west islet, and half a mile north-westward of it, with 8 or 9 fathoms close to.

In passing northward of Tree islands, the Raffles lighthouse should not be brought to the northward of East, nor the reef neared under a depth of 14 fathoms, which will keep a vessel half a mile northward of its northern edge.

KENT ROCKS, between Red, and Tree island reefs, lie N.W. ½ W. and S.E. ½ E. from each other, quarter of a mile apart. From the southern rock, which is the larger of the two, and has 2½ fathoms over it at low-water springs, the north end of Long island is in line with the centre of Red island, bearing S.E. ¾ E., and Raffles lighthouse E. by N. ¾ N. From the northern rock, which is about 30 or 40 feet in circuit, with 6 feet water on it, the southern Tree island bears W. ½ S., distant a mile, and Raffles lighthouse E. by N. ¼ N., nearly 4 miles. The depths close to these rocks are 7 to 10 fathoms, deepening suddenly to 15 and 20 fathoms.

The channel between the south-east rock and the reef surrounding Red island is one mile wide, with depths of 11 to 17 fathoms; that between the northern rock and Tree island reef is three-quarters of a mile wide, with depths of 12 to 20 fathoms. These rocks, however, render the passage between Red island and Tree island unsafe, and it ought not to be attempted.

The position of these rocks may easily be perceived when the tides run strong, by the ripplings over them; observing that the danger lies in the smooth part, close to the break of the rippling. Small fishing boats may be often seen upon them.

RED ISLAND, or Pulo Palompang, is a mere islet or rock 20 feet high, covered with green trees, with a beach of red sand, lying 2¾ miles to the south-east of Tree island. The reef which surrounds Red island, extends from it only a short distance on the east side, but projects more than half a mile on the west side.

REEFS.—Two detached reefs lie in a south-westerly direction from Red island, the outer and larger being distant nearly 1½ miles from it. Raffles lighthouse on Coney island, in line with the north-west extreme of Long island, leads to the eastward; Round island bearing

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E. by N. leads to the southward; and the northern Tree island, open westward of the southern one, bearing N.N.W., leads to the westward of these reefs.

LONG ISLAND or Takong Besar, 115 feet high, and lying three-quarters of a mile south-east of Red island, is similarly surrounded by reefs, and a small islet lies close to its north shore.

Between the south-east side of Red island and the reef extending from Long island, is a channel about a third of a mile broad, with 8 to 17 fathoms water in it.

ROUND ISLAND, or Takong Ketchil, is a small but elevated island, lying half a mile south-east of Long island, $3\frac{3}{4}$ miles W. by S. $\frac{3}{4}$ S. from Helen Mars reef, and $3\frac{1}{2}$ miles S.S.W.-southerly from Raffles lighthouse. The island is surrounded by reefs, projecting from it in places to the distance of a quarter of a mile.

Long island and Round island are also known as the Brothers, both being covered with trees.

Between Long island and Round island reefs, is a narrow channel, close to the south end of the former, with 11 to 13 fathoms water in it.

PHILLIP CHANNEL is formed between Long and Round islands to the north-westward, and the numerous islands fronting Battam and Boelang islands to the south-eastward. It appears to be free from danger, with good anchorage, and is a short route for vessels proceeding to or from Singapore, through Durian strait.

CAP ISLAND, so named from its appearance, is situated at the south entrance to Phillip channel, $3\frac{3}{4}$ miles S. $\frac{1}{2}$ W. from Round island, and 2 miles W. by N. $\frac{1}{2}$ N. from Steep cape. Cap island is a rock about 40 feet in height, with a flat top and perpendicular sides, surrounded by a reef to the distance of about 300 yards, near to which the depths are 10 and 11 fathoms, with 14 fathoms a little farther out.

Mid-channel reef, situated nearly midway between Cap island, and Steep cape the north-west extreme of Boelang island, is about three-quarters of a mile long north and south, and $1\frac{1}{2}$ cables broad; there is a depth of 12 fathoms between Cap island and the reef, and 6 to 18 fathoms between the reef and Steep cape.

The COAST.—That part of the southern side of Singapore strait between Phillip channel, and the Sambo islands, a distance of 8 miles to the N.E. by E., is formed of numerous islands lying on each side of the entrance of Salat Batu Hadji, which separates the islands of the Beolang archipelago, from Pulo Battam.

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The north-west coast of Battam comprises the islands and coast extending from the entrance of Salat Batu Hadji, (described at page 88) in a N.N.E. ½ E. direction to Tanjong Pingee a distance of 3 miles. From Tanjong Pingee the coast line recedes to the S.S.E. forming a deep bay 2 miles wide at the entrance, which, however, with the exception of a channel a quarter of a mile wide, is blocked by coral reefs. Tree island, at the entrance of this bay, is a third of a mile in extent, stands on the edge of the reef which extends from it, and fronts the islets and coast, to High point, at the entrance of Salat Batu Hadji.

Boelang N.W. islands are those outlying this part of the Boelang archipelago, and, together with the Helen Mars reef, lie at the junction of Singapore strait and Phillip channel.

Ganymede, the largest island, nearly a mile long N.W. and S.E., and half a mile broad, is composed of a number of moderately elevated hills, ranging in the direction of its length. A small islet lies close to the north-west extreme, and two others close to the east side; a fourth islet lies nearly half a mile north-eastward of the south-east end of the island, this last being just inside the edge of the reef which here extends off half a mile, gradually diminishing in distance towards the north-west end, from which it projects 3 cables.

Little Ganymedes are two small islands half a mile westward of Ganymede island; the reef which encompasses these, and extends 3 cables outside of them, is half a mile broad, and projects to the south-eastward until it joins the reef which faces, to a distance of 2 or 3 cables, the west side of the large island. Between the reef surrounding the large island and that embracing the two small ones, is a small harbour a mile long and three-quarters of a mile wide at its entrance, narrowing to the width of a quarter of a mile half-way in, and in which the depths are 7 to 3 fathoms.

Two coral ledges, dry at low water, lie off the fairway to the entrance of this small harbour, having a channel 3 cables broad on the east side, and one 4 cables broad on the west side; there are 6 to 10 fathoms water close to the outer of these dangers, except on the north-east side where there are 2½ fathoms. The western extreme of the Little Ganymedes bearing S. ¼ E. leads westward, and the north extreme of Pulo Urup E. by N. ¼ N. leads northward of the outer ledge.

HELEN MARS REEF is the outermost of some dangerous reefs which, together with several small islets, lie off the north-west end of Boelang. From this reef Round island bears W. by S. ¾ S., distant 3½ miles, and Raffles lighthouse is just inside the left extremes of Barn and

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Alligator islands N.W. ¼ N., nearly. A short distance from it are 14 and 15 fathoms.

The north peak of Great Carimon in line with Red island leads close to the northward of this dangerous shoal; Red island, bearing W. ¾ S., will lead well clear to the northward; and Steep cape, the bold headland inside Cap island, if kept to the southward of S. ½ W., will lead to the westward.

BUFFALO ROCK, or Token, 5 feet high, lying well out towards the fairway of the strait, is of a black colour, about the size of a long-boat, with 12 and 16 fathoms water near it to the southward, and irregular soundings of 14, 18, 21, and 25 fathoms close to on the north-west side. It bears S.W. by S. 4 miles from the south extreme of West St. John; S.S.E. 3 miles from Middle island, and East 4½ miles from Raffles lighthouse. The ship *Soliman Shah*, having got over on the south side of the strait during light winds, was drifted by the tide close to this rock, and let go her anchor in deep water, from which she slipped when a breeze sprung up, to keep clear of the danger.

Between the Buffalo rock and the reef off the south-east end of Middle island, the strait is 2½ miles broad, the same breadth as between the Rocky ledges and West St. John.

BARREN ISLAND, the outer of the small islands on the western side of the entrance to Salat Batu Hadji, is a mere rock or islet, and bears N.E. ¼ E. 3 miles from the north-west extreme of Ganymede island; S. by W. ⅜ W., nearly 4¼ miles from West St. John; and E. ¾ S. 5½ miles from Raffles lighthouse.

Close to Barren island are 7 and 11 fathoms, and 12 to 14 fathoms between it and Buffalo rock; northward of it the soundings are more irregular, 17, 21, and 16 fathoms.

Islands and reefs southward of Barren island.—A short distance south-eastward and southward of Barren island are three other islands, similar in size and character, excepting that the southern one has a reef extending from the south part of it, and southward of these are several islands and reefs. The two principal islands are known as High island and Pulo Urup, the former lying S.E. by E. 1⅓ miles, and the latter S. by W. a mile from Barren island. Midway between the southern ends of these is the northern part of another island, about twice as large as High island, but from its situation less important: this island is surrounded by an extensive reef, and has two small islets on each side of it. Further to the southward are many other islets and reefs which, however, are not in in the way of the navigation of Singapore strait.

Close to the reef surrounding the island last mentioned is the eastern end of a large reef which fills up the greater portion of the space between

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Pulo Urup and Ganymede island. Near the middle of the southern edge of this danger is a small islet, from which the western extreme of the reef bears W. by N., nearly three-quarters of a mile, and the northern extreme N.N.W. ½ W., about the same distance: this last part lies almost on a line (N.E. by E. ½ E. and S.W. by W. ½ W.) joining Pulo Urup with the islet off the north-west end of Ganymede island, nearly a mile from the former and 1¼ miles from the latter.

Salat Batu Hadji, or Strait of the Pilgrims rock, separates the Boelang archipelago from Pulo Battam. This strait is said to afford a safe and short passage into Rhio and Varella straits, but it is unavailable not having been properly surveyed, and, from the intricate nature of its navigation, it seems improbable that it will ever come into general use.

The strait may be approached by any of the channels between the groups of islands just mentioned, as also by the channels amongst the islands next to be described; but the safest channel appears to be between the Sambo islands (*see* page 119) and Pulo Blakan Padang, taking care to keep over towards Pulo Mariam, to avoid the coral spit which projects about half a mile eastward of the last-named island. After passing Pulo Mariam, and bringing it to bear N. by E., steer to the southward through the channel separating the groups of islands southward of Blakan Padang from the Battam coast and the islands fronting it.

PULO BLAKAN PADANG, the largest of the islands fronting the entrance of Salat Batu Hadji, is circular and about 1½ miles in diameter; it lies south-westward of the Sambo islands, and is separated from them by a channel half a mile broad, in which the depths are 8 to 15 fathoms. This island is encircled by a reef, which projects a third of a mile from the north point, and half a mile from the south-east and south-west points, but to less distances in other parts.

PULO TELUP, PULO SANNANG, and ADJACENT REEFS.—These are the outermost islands and dangers off the north-west coast, and together with the north part of the island just described, limit this part of Singapore strait to the southward.

Pulo Telup, about half a mile in extent, lies barely a quarter of a mile north-westward of Pulo Blakan Padang, the channel separating them being narrowed to little over a cable in width by the reefs fronting each island. Pulo Sannang is a small islet lying on the north-west edge of the reef which projects nearly 2 cables from the north-east end of Pulo Telup; it bears S.W. by W. ¾ W. about 1½ miles from the north-west extreme of Little Sambo, and S. by E. ¾ E. 3 miles from West St. John.

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Three small patches of reef lie off the west side of Pulo Telup, the outer edges of the two northern and most distant ones lying about West, half a mile from the centre of the island. The third patch lies about a cable off the south-west part of the island. Close to these dangers are depths of 7 and 8 fathoms, and 12 to 14 fathoms a short distance outside of them.

Islands southward of Pulo Blakan Padang.—A cluster of seven small islands stands on a reef nearly 2 miles long W.N.W. and E.S.E., and three-quarters of a mile broad; this reef which lies to the southward of Pulo Blakan Padang, is separated from it by a passage about a quarter of a mile broad, with depths of 3 to 8 fathoms.

Nearly half a mile southward of the middle and largest island of the group are two small islands lying close together, each encircled by a reef; from the western island the reef projects a third of a mile in a W.N.W. direction, having a small detached coral patch lying 3 cables to the westward.

A small island, named Saddle island, lies three-quarters of a mile southward of the two just described, and between are two islets, each fringed with reef. Saddle island is the middle of several small islands and islets which lie at the entrance of Salat Batu Hadji.

Between the various groups are channels with depths varying from 4½ to 11 fathoms.

CAUTION.—Eddies and Overfalls.—Owing to the strong tides which run through this part of the strait, and the rocky and uneven nature of the bottom, violent eddies and overfalls are usually to be met with, more especially on the south side of the channel, towards the Sambo islands; it is therefore advisable to keep on the north side, near St. John islands.

All the islands and dangers, however, south-westward of Sambo islands, except Buffalo rock, are within the 10-fathom edge of the bank which extends from the southern shore of this part of the strait.

Soundings.—The strait, between the Rocky ledges north-westward of Little Sambo and St. John islands (described in pages 119 and 94), is 2½ miles wide, with very irregular soundings varying from 15 or 16 to 40, 50, or 60 fathoms.

NORTH SHORE OF WESTERN PART OF THE STRAIT.

Between Tanjong Bolus, and Tanjong Gul (the south-west extreme of Singapore island), a distance of 9 miles in an E. by N. direction, lies the west entrance of the Old strait or Salat Tambroh, fronted by a bank having 6 to 18 feet water, which extends from Tanjong Bolus and

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terminates in a prong, half a mile to the southward of Tanjong Gul (*see* page 148).

Anchorage.—During the north-east monsoon good anchorage may be obtained about three-quarters of a mile south of this bank in 9 or 10 fathoms water with Tanjong Bolus bearing West, distant 3 miles.

SULTAN SHOAL, or Terumbo Careeman, situated 8½ miles E. by S. from Tanjong Bolus, is circular, about two-thirds of a cable in diameter, and the rocks at its shoalest part are about 2 feet above the sea at low-water spring tides. It is marked by a beacon, painted red and white stripes, from which the north-west extreme of Tree island reef bears S. ¼ E. 5 miles; Pulo Saluk E. by S. ¾ S. 3½ miles; and Raffles lighthouse, just open of the west extremes of Alligator and Barn islands, S.E. ½ E. 7¼ miles. Close to the westward of the beacon are 3 and 4 fathoms, and 7 or 8 fathoms at 2 cables distant, but the east side of the shoal is steep-to, there being 7 fathoms within a boat's length of the rocks.

AJAX SHOAL, on which the steam vessel of that name touched in 1877, lies one mile S.E. by E. ½ E. from the Sultan shoal beacon; this shoal, composed of coral with sharp pinnacles, is about half a cable in extent N.E. by N. and S.W. by S., and has on its south-west extremity a depth of 19 feet.

The following bearings were taken from H.M.S. *Growler*, 1877, whilst at anchor in 5 fathoms, on the shoal, viz.:—Sultan shoal beacon, N.W. by W. ½ W.; Raffles lighthouse, S.E. ⅓ E.; and Tanjong Bolus, W. by N.

A nun buoy, painted red, has been placed on the centre of Ajax shoal, and should be given a berth of 2 cables when passing it, on either side.

SINKI CHANNEL, or Salat Sinki, by which Singapore New harbour is approached from the westward, is bounded on either side by reefs, the edges of which are marked by stone beacons with basket tops; those on the north side, three in number, are painted white, and those on the south side, four in number, red. The length of the channel is 4 miles, and its breadth at the eastern and narrowest part is three-quarters of a mile. The depths in it are very irregular, generally from 9 to 16 fathoms, but in one place, just to the southward of the westernmost beacon on the north side, there are 25 fathoms. The eastern extreme of the channel is about 3 miles to the westward of New harbour, and the western extreme, about the same distance from Sultan shoal.

South side.—Pulo Saluk, a small islet 90 feet high, may be considered as the south-western limit of the Sinki channel. It is sur-

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rounded by a reef which extends a very short distance from its western part, but about a quarter of a mile in most directions, and from its eastern part a coral spit projects nearly half a mile. Pulo Saluk bears S. $\frac{3}{4}$ E. $1\frac{3}{4}$ miles from the beacon on the reef south of Pulo Laut, and S.E. by S. $2\frac{3}{4}$ miles from the reef which forms the north-western limit of the channel.

Beacons.—Three of the beacons which mark the south side of this channel are situated on the northern edge of the large reef that surrounds Pulo Bosing. The first or westernmost beacon bears N.E. $\frac{1}{4}$ E. distant about one mile from Pulo Saluk; the second E.N.E. one mile from the first; and the third is about a quarter of a mile to the eastward of the second. The fourth or easternmost beacon stands on the northern edge of the reef that surrounds Freshwater island or Pulo Bukum, and bears E. by N. distant one mile from the third.

North Side.—The westernmost reef on the north side of Sinki channel is awash, and lies N.E. by E. $\frac{1}{4}$ E. $2\frac{1}{8}$ from Sutton shoal and N.W. $\frac{3}{4}$ N. $2\frac{3}{4}$ miles from Pulo Saluk.

About $1\frac{1}{2}$ miles E.S.E. from the westernmost reef, and 3 miles E. by N. from Sultan reef, lies a small reef having a white beacon on its north side.

Half a mile north of this reef is the small island Pulo Laut, having a smaller island close to the eastward of it. These two islands are the southernmost of an extensive group of islands lying close together, to the northward of which (between them and the Singapore shore) is a navigable channel named Salat Sambulon.

Cyrene reef forms the north-eastern limit of Sinki channel, and is the first reef westward of New harbour; from its south-east extreme Berlayer point bears E. by N. $\frac{1}{8}$ N. $2\frac{3}{8}$ miles. It is about half a mile in extent north and south, and more than a mile east and west, and very irregularly shaped, the western part forming a narrow spit; on the northern part is a sand patch, having upon it a spot of coral which is barely covered at high water. From the south side two small horns project into the channel, the extreme of each being marked by a white beacon.

DIRECTIONS.—Coming from the westward, and intending to proceed through the Sinki channel, a course may be steered to sight the red and white striped beacon on the Sultan shoal, which may be passed at a prudent distance on either side; after passing Sultan shoal, care is necessary to avoid Ajax shoal, which lies one mile S.E. by E. $\frac{1}{2}$ E., from the Sultan shoal beacon (*see* page 90). But to provide against the chance of the beacon having disappeared, or in the event of thick weather, the safer plan will be to steer for Pulo Saluk—which being a small round islet

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90 feet high can be readily distinguished—on an East or E. ½ S. bearing. When the beacon is seen, and brought to bear from N.N.W. to N.W., steer from E. by N. to E.N.E., giving Pulo Saluk a berth of 1¼ miles; after it is passed keep a good look-out for the outer beacons on either side and steer mid-channel between them.

The same course, E. by N.—always remembering to guard against the effects of tide—will lead to the entrance of New Harbour, which should also be entered in mid-channel (*see* page 109).

If the tripod beacon upon the Sultan shoal cannot be seen, a vessel should not proceed until quite certain of her position, and assured that some accident must have happened to the beacon. As the mail steam vessels, both to and from Europe, now pass through the Sinki channel, great attention is paid to the beacons which mark it.

A GROUP of ISLANDS, about 5 miles in extent, lies to the southward of Sinki channel, and to the westward of St. John and Blakan Mati islands, from which it is separated by a navigable channel nearly 3 miles broad. The islands are all small, divided by deep channels, which however, are so encumbered with reefs as to render them unavailable for anything but boats.

Freshwater island, or Pulo Bukum, and Pulo Bosing are the northern islands of the group; they have been previously mentioned in connexion with the Sinki channel, of which the reefs extending from them form the southern limit; Pulo Saluk, the south-west limit of that channel, is the north-west island of this group.

Pulo Sudong is a small island, nearly 1¼ miles E.S.E. from Pulo Saluk, having two small islets off its north-west end. The island stands on the eastern part of an extensive coral reef, the western edge of which is a mile distant from it, the north-west edge being separated from the reef encompassing Pulo Saluk by a very narrow passage with 5 and 6 fathoms water.

Alligator Island or Pulo Runcum, about a mile in extent, 185 feet high, and of a sloping form, the highest part being at its south end, lies about half a mile to the southward of Pulo Sudong, and nearly joins the north-west end of Barn island the space between the reefs encompassing each island affording no safe passage for vessels. At a quarter of a mile from the south end of Alligator island there are 14 and 16 fathoms, but off its west side not more than 6 to 9 fathoms will be obtained at half to two-thirds of a mile.

Barn Island, or Pulo Sennang, lies half a mile south-east of Alligator island; and E. by N. ½ N. 5 miles from Tree island. It is about a mile in extent, 133 feet high, of a square level aspect, covered with trees, and visible at the distance of 15 miles. Barn island is fringed with reef,

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which extends a quarter of a mile from its east side, but barely two cables from its south and west sides, close to which are 9 and 11 fathoms, with 18 and 19 fathoms at a short distance.

The Rabbit and Coney are two small islets, nearly connected with the south-east end of Barn island by a reef of rocks partly dry at low water. The Coney, or southernmost, is the smaller, and distant from the south-east point of Barn island rather more than one-third of a mile. The Rabbit when in line with the centre of Barn island bears N.W. $\frac{3}{4}$ W., the Coney in line with it, N.W. $\frac{3}{4}$ N., nearly, and the Rabbit and Coney islets are in line with each other, when bearing N. by E. $\frac{1}{2}$ E. A rocky spit, covered at high tide, projects from the Coney nearly a cable to the southward; consequently the islet should be given a berth of 2 cables.

RAFFLES LIGHT.—The lighthouse on Coney islet, named after Sir Stamford Raffles, the founder of Singapore, is 91 feet high, and exhibits at an elevation of 105 feet above high water, a *fixed* white light which is visible from a distance of 12 miles, between the bearings of S.E. by E. round north to W.S.W., or over an arc of 236°. It bears S.W. by W. $\frac{3}{8}$ W. $7\frac{1}{4}$ miles from the south end of West St. John island; E. $\frac{1}{2}$ N. nearly $5\frac{1}{2}$ miles from the north end of Tree island reef; S.E. $\frac{1}{2}$ E. nearly $7\frac{1}{2}$ miles from the Sultan shoal; N.W. $2\frac{3}{4}$ miles from Helen Mars reef; and West $4\frac{1}{8}$ miles from Buffalo rock.

Mangrove Island and Reefs.—Mangrove island (Pulo Simakau) about a mile in extent, lies near the centre of the group, $2\frac{1}{2}$ miles N.N.E. from Coney islet, and about $1\frac{3}{4}$ miles westward of Middle island, between it and Middle island is an islet surrounded by a reef.

Southward of Mangrove island are several reefs, or small coral patches, the three outer ones of which bound the north side of the channel between Middle island and Barn island. The southern extremes of these dangers lie nearly in a line about S.W. by W. $\frac{1}{2}$ W. from the south-east end of Middle island, from which the nearest is distant nearly $1\frac{3}{4}$ miles: the eastern patch is partly dry, over the middle one are $1\frac{3}{4}$ fathoms, and over the western $2\frac{1}{2}$ fathoms.

The north-west apex of Barn island bearing W.S.W. leads rather close to the western patch, but nearly a quarter of a mile clear of the other patches; the peak of the Great Carimon in line with the north part of Barn island also leads close to the southward of the western patch, but well clear of the others; it is advisable, however, not to come inside, or to the northward of a line joining the southern extremes of West St. John and Barn islands.

Middle Island, or Pulo Sabaroot, the eastern island of the group, is half a mile long N.W. and S.E., 78 feet high, and surrounded by a reef which projects from the south-east point nearly half a mile; its south end

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bears N.E. ½ E. 4¼ miles from Raffles lighthouse and W. by S. 3¼ miles from west St. John.

A dangerous Ledge of rocks lies S.E. by E. three-quarters of a mile from the south-east point of Middle island. The ledge is small, and always covered, except at very low tides, some points of the rocks being then just discernible. From it the south extreme of West St. John island bears E.N.E. 2¾ miles, Raffles lighthouse S.W. by W. ¼ W. 4½ miles, and Buffalo rock S. by E. 2¼ miles. On the south side of this ledge are 12 and 14 fathoms close-to; on the north side it is said to be a steep coral wall, and the chart shows 8 and 10 fathoms close to this side.

Pulo Jong—a small round islet 75 feet high, lying half a mile north-west of Middle island—open eastward of Middle island, leads north-east of the ledge, and the south point of West St. John N.E. by E. ½ E., or Raffles lighthouse S.W. by W. ½ W., leads to the southward; the high peak of the Great Carimon in line with the north part of Barn island will also lead to the southward of this danger.

The SISTERS are two small islets not quite a mile to the westward of West St. John island; the South Sister, named Pulo Soobur, is 89 feet high. They are surrounded by reefs, which in places extend to the distance of a cable, and close to their edges are irregular soundings of 5 to 9 fathoms. South from the South Sister the soundings soon deepen to 10, 12, 16, and 18 or 19 fathoms. The channel between them and West St. John is free from danger, with depths of 14 to 24 fathoms. Nearly half a mile W.S.W. of the Sisters is a bank of 3 fathoms, with 5 and 6 fathoms between, and a short distance westward of this bank is another of 5 fathoms.

ST. JOHN ISLANDS, three in number, form the south-western limit of Singapore roads. They lie about N.E. by E. and S.W. by W. from each other, extending nearly a mile in those directions.

West St. John island is about one mile long N.W and S.E. and a quarter of a mile broad. Its south-east extreme is joined to the main body by a narrow neck of low land, which at a little distance gives it the appearance of a separate islet. A reef extends about a third of a cable from its southern and western sides, and 1¼ cables from its eastern side.

The middle island, known as East St. John island, is about half a mile long N.W. and S.E., a quarter of a mile broad, 189 feet high, and surrounded by a reef which extends a little over half a cable from its south point, and 1¼ cables from its south-eastern shore.

Peak island, or Pulo Tambakool, the north-easternmost and smallest of the three, has a peaked hill 101 feet high. From the western part of

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this island, a low, narrow, sandy neck extends, having on its extreme a small mound, which at some little distance appears like a separate islet. The island is encompassed by a reef which extends from it about three-quarters of a cable in a southerly and south-easterly, direction, and 2 cables in a north-westerly direction.

Between these islands are narrow channels about half a cable wide, with depths of 6 to 16 fathoms in them.

Close to the eastern side of the reef surrounding Peak island are 6 to 8 fathoms with 21 to 23 fathoms, at 2 cables distance, decreasing to 14 and 12 fathoms a little farther to the eastward. Close to the southern side of the reefs fronting the East and West St. John islands are 9 or 11 fathoms, deepening to 22, 24, 26, or 30 fathoms, at one to 2 cables distance. The west side of West St. John island is bold close-to, there being 16 or 17 fathoms at less than half a cable from it.

ISLANDS and DANGERS.—In the space between St. John islands and Blakan Mati, are a few small islands and several extensive reefs. Between the latter are channels of deep water, but they are so narrow and intricate as to be useless for the purposes of ordinary navigation.

Pulo Ringat is the easternmost of two small islets which lie close to the north-eastward of St. John islands.

Pulo Sikookur, about half a mile long N.W. by N. and S.E. by S., but very narrow, lies nearly mid-channel between West St. John and Blakan Mati islands.

Clearing Marks.—To avoid all the dangers between St. John islands and Malay point, Peak island must not be brought to the eastward of S. ½ E., while mount Serapong bears to the northward of W.N.W. When mount Serapong is to the westward of W.N.W., a vessel may stand on until the western extreme of West St. John island bears S. by W. ½ W., but no farther.

BLAKAN MATI ISLAND lies to the southward of the southern part of Singapore island, from which it is separated by a channel now known as New harbour. The island is 2 miles long E.S.E. and W.N.W., and its western end terminates in a point, but its eastern extreme is a mile broad It is fringed by a reef, which from Berala point, its north-eastern extreme, projects a quarter of a mile to the eastward; this part of the reef is known as Berala spit, and from its outer part Berala point bears W. ¾ S., and the hill over Pagar point N. ¼ W.; thence it trends about S. by W. for the eastern extreme of the island, from which it projects but a short distance. Off the south point of the island the shore reef extends about three-quarters of a cable, and about the same distance along

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its west side; but a small detached reef, named Pelawan, about 1½ cables in extent, lies 2 cables from the west shore of the island, nearly midway between its southern and western extremes.

Mount Serapong, rising to the height of 302 feet near the north-eastern extreme of Blakan Mati, is conspicuous when approaching Singapore roads from the eastward, and will assist a stranger in making out the land, St. John islands being seen to the southward of it. There are several other hills of less height than Serapong upon Blakan Mati, but they are more observable in coming from the westward, when they will be seen under the higher land of Singapore island.

Over Rimau point, the west extreme of the island, is mount Siloso, 170 feet high, to the eastward of which, and south from Berdaun rock, is mount Imbeah, 202 feet high. South-eastward from Imbeah is a hill 168 feet high, westward of which is another 160 feet high.

Soundings.—At the western entrance of Singapore strait the depths in mid-channel are 20 to 23 fathoms, increasing to 28 and 29 fathoms within 2 miles of Little Carimon island, and decreasing to 16 and 17 fathoms within 2 miles of Tanjong Bolus. In the fairway of the strait the soundings vary from 23 to 17 fathoms for a distance of 6 or 7 miles eastward of a line joining Little Carimon island and Tanjong Bolus, where there is a depth of 25 fathoms, thence 20, 19 and 12 fathoms, to a line joining Tree island and Sultan shoal.

About midway between Tree island and Sultan shoal is the north-western extreme of a bank which extends 3½ miles in a south-easterly direction, its average breadth being nearly half a mile, having on it 6 to 9 fathoms and 11 to 17 fathoms close-to. Between this bank, Pulo Saluk and Sultan shoal, the depths are 9 to 17 fathoms; near the Sultan shoal the decrease is sudden from 12 to 8 fathoms.

Close to the south edge of the reef which surrounds Alligator island are 14 fathoms, but a bank with 7, 8, and 9 fathoms over it, extends about three-quarters of a mile from the west side of that island, between which and the off-lying bank are soundings of 13 to 15 fathoms.

Close to the reefs which surround the islets bounding the south side of this part of the strait are 8 to 12 fathoms, with depths under 20 fathoms, from half to three-quarters of a mile from them; but outside the distance of a mile, between Kent rocks and Red island, the depths increase to 34 and 37 fathoms, and between Red and Long islands to 40 and 50 fathoms.

A patch of 10 fathoms lies about a mile W.S.W. from Coney islet; and a little over 1½ miles to the westward of Raffles lighthouse is the south-eastern extreme of the bank, with 6 to 9 fathoms on it. Between

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this 10-fathom patch and Barn island are depths of 19 fathoms; and 11 to 17 fathoms between the south-east extreme of the large bank and the same island, those depths being found very close to the reef which extends from the island.

The soundings south of Coney islet are deep but irregular; near the reef which projects from it are 20 fathoms; at the distance of half to three-quarters of a mile are 18 and 15 fathoms, quickly deepening to 23 and 27 fathoms; south-westward from Coney, depths of 18 to 22 fathoms extend to the distance of about 1½ miles, thence deepening to 40 or 50 fathoms towards Long island.

Between Coney islet and Helen Mars reef the soundings are 19 to 30 fathoms; half a mile north-eastward of Helen Mars reef, is the southern part of a bank, which is about a mile in extent with 9 to 11 fathoms water; between the bank and Barren island there are 14 to 16 fathoms.

Soundings under 20 fathoms extend about 1½ miles north-westward and a mile westward of the bank just mentioned, and similar depths extend in the same directions about the same distance, from Helen Mars reef and the two small Boelang N.W. islands: outside the limits just named the depths suddenly increase to 23 or 30 fathoms.

Between Barren and Telup islands, the depths are 10, 11, and 8 fathoms, and not less than 5 fathoms has been found anywhere in the space farther southward, included between the reefs surrounding the islands of the High island group, and the west side of Blakan Padang reef.

A mile outside Barren island the depths are generally 14 to 18 fathoms, and one cast of 21 fathoms appears on the chart about 6 cables N.N.E. from it. Soundings of 19 fathoms extend three-quarters of a mile in a N.N.E. direction from Buffalo rock, but these appear to be on a horn of the bank, as there are 25 fathoms a short distance to the eastward, and 35 fathoms half a mile to the westward. Depths of 14 to 16 fathoms extend three-quarters of a mile eastward of Buffalo rock, but just outside them are 21 to 25 fathoms. Between Buffalo rock and Middle island there are 16 to 35 fathoms.

A bank composed of rotten rock and sand having general depths of 13 to 19 fathoms, extends between the bearings of South and E.S.E. from Middle island; and between Raffles lighthouse and the western extreme of this bank the depths are 30, 49 and 25 fathoms, but decrease to 20 and 18 fathoms when within the distance of three-quarters of a mile from the reefs which bound that part of the strait.

A bank with 13 to 19 fathoms lies in front of the Sisters, extending from them more than a mile in a southerly and south-easterly direction; and close to the southward of St. John islands the soundings are very irregular from 20 to 33 fathoms.

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In mid-channel, between St. John islands on the north side, and Pulo Sannang and Pulo Sambo on the south side, the soundings are 34 to 85 fathoms; on the south side of the channel close to Batu Beranti and the rocky ledge westward of it are 15 to 25 fathoms, increasing to 30 and 40 fathoms a short distance off. A bank with depths under 20 fathoms, but irregular in contour, fronts the whole of the islands and dangers on this side of the strait, between Helen Mars reef, and Batu Beranti.

Between Pulo Sannang and the ledges west of Batu Beranti, the edge of this bank is about half a mile from the shoal soundings near the reef extending from the north part of Pulo Blakan Padang, and nearly three-quarters of a mile outside Pulo Sannang, the depths beyond quickly increasing to 40 fathoms off the ledges and 26 or 30 fathoms off Sannang.

Tides.—The tidal stream from Malacca strait when setting to the eastward, and the tidal stream from the China sea when setting to the westward, meet between Tree island and Tanjong Bolus. It is high water, full and change, at Coney island, at 11 a.m., but the tide does not set to the eastward till about 1 p.m., and it is then about half ebb by the shore.

Between Tanjong Bolus and Tree island no dependence can be placed upon the set of the tides, for they sometimes run strong towards Durian strait, and at other times to the northward towards the Old strait of Singapore.

From Tree island to Raffles lighthouse the tides cannot be depended on to set as fairly through the channel as they do to the eastward of the lighthouse, but may be expected to draw more across the channel in a north-easterly and opposite direction. The tides set fairly through the channel about E.N.E. and W.S.W. between Raffles lighthouse and St. John islands, frequently very strong, with eddies on the springs. Their velocity, when strongest, is from 4 to 4½ miles per hour, making it unpleasant to anchor here in large vessels when the weather is unsettled in the night, particularly if unacquainted.

The tidal stream has been observed in both monsoons to run to the westward 10 or 12 hours at a time, or even 18 hours, strong and weak alternately; at other times, it sets only 6 hours to the westward, and the same length of time to the eastward; but the tides throughout Singapore strait are seldom very regular.

During the strength of the north-east monsoon at neap tides, the stream sets to the westward at times for three or four days, although there is a regular rise and fall by the shore.

Horsburgh states the perpendicular rise and fall of tide in the strait to be 12 to 14 feet at springs, but it is probably not so much as that, for Staff-Commander J. Richards, R.N., commanding H.M.S. *Saracen*, found

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the rise and fall in New harbour to be 10 feet at springs and 7½ feet at neaps.

TEMPORARY ANCHORAGES.—Owing to the strong tides and currents in the western part of Singapore strait, sailing vessels are frequently obliged to anchor, for which purpose the north side of the channel is to be preferred. From a line joining Tree island and Sultan shoal to Raffles lighthouse there is convenient anchorage in 6 to 12 fathoms all along the north side of the strait, while to the southward the water is deep, and the bottom rocky; the south side of this part of the strait is, therefore, unsuitable for anchorage, especially as violent squalls are of common occurrence. The most convenient anchorages between Raffles lighthouse and St. John are the banks which front the Sisters and Middle islands; *see* page 94.

Abreast of the south end of St. John islands, vessels ought not to anchor if it can be avoided, for the water is deep, and the tides run in eddies with greater strength than in any other part of the strait.

There is fair anchorage between Buffalo rock and Helen Mars reef, as well as about a mile or so to the northward and westward of the latter danger; also a mile or two eastward of Buffalo rock, in 12 to 19 fathoms, or between it and Barren island. Vessels may stand closer inshore and anchor in depths under 10 fathoms, inside of a line N.E. by E. ½ E. and S.W. by W. ½ W. of Barren island; it is, however, unadvisable to go too close in, on account of the strong tides sometimes rendering it difficult to get under way again, especially in the light winds which prevail here.

CAUTION.—Vessels at anchor, or coming to an anchor during the night, should be careful to ascertain their exact position as nearly as possible, and to have a good bearing of Raffles light; they should also keep a vigilant look-out that they do not drag their anchors and drift into danger.

Horsburgh gives the following directions:—"If when at anchor during the night the weather becomes squally, making a ship sheer about with a strong tide and part her cable, do not let go another anchor, except it be dark,* but run as the wind permits, either round the Coney, and anchor to the westward of Barn island, out of the tide, or round the south point of St. John, and anchor to the north-eastward of it, as convenient, in Singapore roads."

DIRECTIONS.—To proceed to the eastward through the western part of Singapore Strait:—When in mid-channel between Little Carimon and Tanjong Bolus, in 17 to 20 fathoms

* Raffles light now obviates difficulty with this cause.

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water, steer East or E.S.E. as the prevailing wind and tide require, observing to bring the north point of Little Carimon W. ½ S., or draw gradually the north peak of Great Carimon in one with the south point of Little Carimon, bearing about W. by S. ½ S., which will lead about 2 miles northward of Tree island. If the wind be southerly, borrow towards Tree island to 14 fathoms, about a mile distant, but no nearer, which will favour the vessel in rounding the Rabbit and Coney.

Raffles lighthouse bearing between E. by S. and E.S.E. is the fair channel course between Tree island and Sultan shoal, not bringing the lighthouse to the northward of East to avoid Tree island, nor to the southward of S.E. by E. or at night, not to lose sight of the light, to clear the Sultan shoal. Having passed Tree island steer to round the lighthouse from a quarter to one or 1½ miles distant; or if the wind and tide be adverse, or from other circumstances it be desirable to do so, anchor to the westward of Barn island, out of the strength of the tide. Having rounded the lighthouse, steer to pass St. John islands at a convenient distance—from 2 cables to a mile, not bringing the lighthouse to the southward of S.W. by W. ½ W., or the south point of St. John to the eastward of N.E. by E. ½ E., to avoid the danger on the north side of the channel. After rounding St. John, and bound to Singapore roads, proceed as directed at page 117; and if bound through the eastern part of the strait, as at page 140.

In Working through between St. John islands and Raffles lighthouse, it is usual to keep on the north side of the channel, making short tacks if necessary, as that part of the strait affords tolerably convenient anchorage along the greater portion of it, and vessels are liable to meet with light baffling airs which would render it necessary to anchor. It is especially requisite to attend to this when to the eastward of Buffalo rock, for on that part of the south side of the strait the water is deep, and the bottom rocky and unsafe for anchoring, the danger being much increased by rapid currents and tides with violent eddies and overfalls.

All danger on the north side of this part of the channel will be avoided if the south extreme of St. John islands be not brought eastward of N.E. by E. ½ E., or Raffles lighthouse southward of S.W. by W. ½ W., but these bearings more particularly apply to the rock which lies S.E. by E. from Middle island. While to the westward of the rock, which may be known by seeing Pulo Jong open of the west side of the island, vessels may stand to the northward until the south end of St. John bears E.N.E., but nothing to the eastward of that bearing; they may, however, with proper precaution, stand farther over between Middle island, and

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the Sisters, and bring the south end of St. John as far as E. by N., being careful, when nearing Middle island not to bring Pulo Jong in line with the east extreme of Middle island until the lighthouse bears S.W. by W. ½ W., or the south end of St. John N.E. by E. ½ E.

The narrowest part of the channel is when Buffalo rock bears S. by E. to South, between it and the rock lying south-eastward of Middle island; and to know in the night when the vessel is in this part of the channel, Middle island will in general appear nearer, and be seen more distinctly than the other islands on the north side the channel. When approaching Buffalo rock, until Middle island bears N. by W. the vessel will be westward of it, and in daylight may stand to the southward, if necessary, until Red island bears W. ¾ S., to avoid Helen Mars reef, page 86, but it is better to keep over towards the Coney. When Middle island bears N. by W. be careful to keep Raffles lighthouse to the southward of W. ¾ S.—on no account must it be brought to the westward of W. ½ S. when Middle island bears N.N.W.

To proceed from Singapore roads or from the eastward, through the western part of Singapore strait, steer to pass the south point of St. John islands as close as the wind may permit, and then about S.W. by W. ½ W. to round the Rabbit and Coney. It is better to keep nearest the north side of the channel in this track, to avoid the Buffalo rock; but remember the reef off the south-east end of Middle island. The south end of St. John bearing N.E. by E. ½ E., or Raffles lighthouse S.W. by W. ½ W., leads clear of this reef, and either of these are safe bearings to lead along the north side of the channel until Raffles lighthouse is approached, which may be rounded at the distance of 2 or 3 cables, if the wind be northerly.

After rounding the lighthouse, steer W.N.W. to pass between Tree island and Sultan shoal; the lighthouse kept between the bearings of E. by S. and E.S.E. will lead in a good fairway course, but it must not be brought at all to the northward of East to avoid Tree island, or to the southward of S.E. by E. or, if at night, the light must not be lost sight of, to clear the Sultan shoal; having passed between those dangers, a course West or W. by N.—according to the set of the tide and other circumstances—will lead between Little Carimon and Tanjong Bolus.

Caution.—In hazy weather during the night, great care must be taken in steering between Raffles lighthouse and Tanjong Bolus, for no dependence can be placed upon the set of the tides, for they sometimes run strong towards the Strait of Durian, at other times to the northward towards the Old strait of Singapore.

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SINGAPORE NEW HARBOUR.

New harbour, the name given to the channel between Singapore and Blakan Mati islands, is about 2¾ miles long, in a general direction East and West, but the main channel takes a somewhat serpentine course; the breadth of the harbour is not more than 1½ cables in several places. The western entrance which is little more than one cable wide, lies between Riman point (the north-west extreme of Blakan Mati island) and Berlayer point (the south extreme of Singapore island). The eastern entrance is bounded on the north by the Malay and Pagar spits, and on the south by Buran Darat reef, and the reefs surrounding the eastern sides of Blakan Mati and Ayer Brani islands.*

As an anchorage New harbour is very indifferent, for the breadth of the navigable channel is but 100 to 200 yards, the bottom is rocky and foul, and affords but bad holding ground, whilst the tides run through it with great velocity; there is, from these circumstances, great risk of vessels dragging their anchors and going ashore, especially during the violent squalls which are common in this part of the world.

Notwithstanding these serious drawbacks, New harbour has grown into a place of considerable importance, for it possesses facilities for constructing jetties and making docks, which render it of the highest possible value to a large shipping port like Singapore, situated in the very centre of Eastern commerce. The Peninsular and Oriental Company, together with other steam proprietors and merchants, have erected extensive coal stores, wharves, and jetties, the latter allowing of the largest steam vessels being lashed alongside in perfect security. It is the place of arrival and departure of the mail steam vessels; and all other steam vessels, no matter how large, proceed here to coal. There are three capacious dry docks, with engine-house, workshops, and all needful appliances for repairing ships.

The whole of the above establishments are situated on the north or Singapore side of New harbour, but the English and French Governments have coal wharves and jetties on Pulo Ayer Brani, an island lying in the middle of the eastern entrance to the harbour, and dividing it into two channels.

Both sides of the harbour are fringed with reefs which dry at low water, but close to their edges are depths of 3¼ to 4¼ fathoms, increasing suddenly to 5 and 6 fathoms, and to this circumstance New harbour owes its importance. The deep water at the edges of the reefs allowing the largest vessels to come alongside, it is but a simple matter to construct jetties to

* *See* Admiralty plan of New harbour, No. 2,023; scale, $m = 12$ inches.

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secure the vessel to. These jetties, of course, greatly facilitate the coaling of steam vessels and landing of cargo, which, at the anchorage in the roads, can only be done by means of boats.

Docks.—The following are the dimensions of the docks above mentioned:—Patent Slip and Dock Company's docks in Chermin bay: No. 1 dock, length 459 feet, breadth 62 feet, depth over sill 19 to 20 feet; No. 2 dock, length 415 feet, breadth 42 feet, depth over sill 14 to 15½ feet. Tanjong Pagar Company's Victoria dock; No. 3, length 450 feet, breadth 65 feet, depth over sill 20 feet*; Bon Accord dock on south side of Ayer Brani island; No. 4, 200 feet completed, and 100 feet in progress in 1869.†

North side of New Harbour.—The shore reef which extends from the north-west limit of the harbour and passes about a quarter of a cable outside Lots wife, trends to the northward one cable, and about the same distance to the eastward, forming a small bay nearly filled with shoal water, thence to the north-eastward for about 1¼ cables to the foot of mount Chermin, from which the reef curves to the eastward, forming Chermin bay. On the eastern side of this bay are two of the docks, and works previously alluded to; the reef thence trends in an E. by S. direction for 3 cables to the Peninsular and Oriental jetties, which have extensive coal stores and godowns behind them. The whole of these buildings are on ground that was once a small island, but is now connected to Singapore by a roadway.

These jetties extend 1½ cables in an easterly direction to the entrance of a shoal bight named Sibet bay; on the opposite side of which, at about a cable to the eastward, is St. James hill, 70 feet high, having a house and some trees on its summit, and is a beautiful feature in the delightful scenery of this harbour. This hill juts out from the main (to which it is connected merely by a low, narrow neck) close to the edge of the reef, which is marked by a red beacon midway between St. James hill and the jetties. Mooring buoys, painted red, are placed off the jetties, and a dolphin at either end, to assist in securing steam vessels when coaling.

On the east side of St. James hill is a shoal bight named Blangah bay, about a cable wide at its entrance. From the east point of this bay the edge of the reef trends about N.E. by E., and for a distance of nearly a quarter of a mile is lined with a row of jetties with coal stores and godowns behind them. At 2 cables east of the jetties the edge of the reef is

* H.M.S. *Charybdis* was placed in No. 3 dock, 14th July 1874, (spring tide,) when 18 feet 6 inches was the greatest depth over the sill. *Navigating Lieutenant B. S. Bradley.*

† No. 4 dock was closed in 1877.

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marked by a red beacon, close to which are 3½ to 5 fathoms water. About two thirds of a mile to the eastward of this beacon is Pagar spit, which extends S.S.E. ½ E. a third of a mile from Tanjong Pagar, and forms the north-eastern limit of New harbour. The extreme of the spit is marked by a red beacon, and there is another red beacon at a cable to the north-westward of it.

On Pagar point are the Tanjong Pagar Company's dock and works.

BERLAYER POINT, the north-western limit of New harbour, is formed of cliffs of moderate elevation, and projects in a S.S.E. direction from the low mangrove behind it to a rather sharp point. From this point the coast trends in a north-westerly direction and is fringed with a white beach named Pasir Panjang, or long beach, upon which, at a cable from Berlayer point, stands a board, denoting the harbour limit in this direction.

Lots Wife is a rock about 6 feet above high water, lying immediately off the pitch of Berlayer point, about a third of a cable inside the edge of the shore reef, which is here steep-to. This rock was formerly much higher, and had the appearance of a pillar, hence its name.

Berlayer Rock, with 7 feet water over it, is marked by a beacon, and lies S.W. rather more than half a cable from Berlayer point. H.M.S. *Charybdis* touched upon this rock.

A Patch having 3¼ fathoms water over it, lies West-southerly, a quarter of a mile from Berlayer point, and is the shoalest part of a bank having depths of 4 and 5 fathoms, with 7 and 8 fathoms close to its outer edge, and 6 fathoms between it and the shore reef fronting Pasir Panjang beach.

To clear this patch, and also the Berlayer rock, keep Tereh point, a conspicuous red bluff on Ayer Brani island, well open south of the Peninsular and Oriental Company's jetties.

RIMAU POINT, the north-west extreme of Blakan Mati, and the south-west limit of New harbour, is formed of cliffs with patches of shelving rock projecting from their bases. The shore reef extends only a short distance from the north and west sides of the point, and close to it are 3½ and 4 fathoms, excepting in a W.N.W. direction from the west extreme of the point, where a narrow tongue with but 7 feet water projects to a distance of half a cable.

Hantu, the small round island lying in front of Chermin bay, is nearly 1½ cables in diameter, 96 feet high, and covered with trees. Its southern side, being nearly in the same line as the Peninsular and Oriental jetties and Lots wife, forms part of the northern side of the main channel of the harbour. A reef surrounds the east, south, and west sides of the island,

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the edge of which, on the south side, is marked by a white beacon. The north-east side, opposite the dry dock, is free from reefs, with 3 fathoms water close-to. On the east side of the island is a ship yard, with a patent slip for vessels under 200 tons.

Berdaun rock is a small patch of reef above water, grown over by mangrove trees, distant about half a mile E. ¼ N. from Rimau point, and half a cable from the Blakan Mati shore. A reef, dry at low water, extends about two-thirds of a cable westward, and about a third of a cable northward and eastward from it. Close to this reef are 2¾ and 3 fathoms water, excepting on its eastern side, where the depths are less, there being but 2¾ fathoms at two-thirds of a cable from the mangrove trees on the rock.

Between this rock and the shore there is a channel, about one-third of a cable wide, with depths in it of 3½ to 5½ fathoms.

Silugu island lies at the western entrance of Sinki strait, about 1½ cables to the eastward of Berdaun rock, and fronts a shallow bight, dry at low water, named Imbeah bay. It is a remarkable little island, almost circular in shape, and moderately elevated, with a small bungalow on its summit.* The shore reef projects from the coast, a short distance outside this island ; close to it are 3½ to 5 fathoms.

On a projecting point of Blakan Mati, a short distance to the south-eastward of Silugu, is a jetty for heaving down vessels.

Keppel rock, with 15 feet water over it, lies W.S.W., a cable from the western extreme of the Peninsular and Oriental Company's works. Close around the rock are soundings of 5 and 6 fathoms. The south extreme of St. James hill on with the eastern extreme of the Peninsular and Oriental Company's jetties leads southward of the rock.

Meander shoal, about a cable in extent, east and west, with 6 to 16 feet water over it, lies on the south side of the main channel of New harbour, about 1½ cables south of the Peninsular and Oriental Company's works, and a cable to the north-west of the extreme of the spit extending from Risim point. The shoal is marked by a pile near its north-west end; and a red buoy near its south-east; around it, and in the channel between it and Risim spit, the depths are 3½ to 4½ fathoms.

A mooring buoy, for the use of the Peninsular and Oriental Company's steam vessels, is placed 110 yards to the northward of the eastern extreme of this shoal.

* This bungalow is named Pilot house on the chart of New harbour, owing to its having been built and first inhabited by Mr. Clunis, then the Pilot for the Peninsular and Oriental Company; but it is not the usual residence or station of a pilot, as might be inferred from the name given to it.

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MOUNT FABER is the name of a conspicuous range of hills which rises boldly on the northern shore, about the middle part of New harbour. The direction of the range is about N.W. and S.E., the highest point, 357 feet, being towards its north-west end. Near the middle of the range is a flagstaff, which, like that upon fort Canning hill, is crossed by two yards, used for signalling the arrival of ships from the westward, and repeating the signals made from fort Canning. The height of the range where the flagstaff stands is 303 feet, exactly the same height as mount Serapong on the opposite side of New harbour.

Eastward of mount Faber, behind the wharves and jetties, are several small hills 100 to 132 feet high.

AYER BRANI ISLAND commonly known as Pulo Brani, lies inside the eastern entrance to New harbour. It is nearly two-thirds of a mile long, N.W. and S.E., and the same extent East and West; its greatest length is on its north-eastern side, facing Singapore roads, and upon this part are three hills, the middle one, which is the highest, being 168 feet above the sea. Tereh point, the north extreme of the island, and Teregeh point, the south-east extreme, are both formed by cliffs; those forming Tereh point are of a red colour and present a bold red bluff, which is conspicuous when viewed from either entrance of the harbour.

This island, like Blakan Mati, is encircled by a coral reef with occasional patches of sand upon it, which uncover at two-thirds ebb. From Risim point the west extreme of the island, the reef extends $1\frac{3}{4}$ cables to the westward, and forms a spit, having a white beacon on its outer edge, thence it trends about E.N.E. 4 cables, to the naval coal store jetty, on the west side of Tereh point from which the reef projects only about 20 or 30 yards. From Tereh point it curves round to the south-eastward, passing about a cable outside Silingsing point, at the middle of the east side of Ayer Brani, and terminates abreast Teregeh point. From this point the reef projects about half a cable to the southward, and more than 2 cables eastward, the extreme of the latter part being known as Teregeh spit, and marked by a white beacon. A black buoy is moored in 5 fathoms on the edge of Brani reef, off Brani bay, with the red beacon on the north shore bearing N. $\frac{3}{4}$ W. nearly 3 cables.

The south-east edge of this reef is also marked by a black buoy in 3 fathoms, with Teregeh spit beacon, bearing S.W. by W. $1\frac{1}{4}$ cables.

The north-west side of Ayer Brani, between Tereh and Risim points, is the most important part of the island. Between these points is Saga bay, dry at low water, which offers great facilities for the construction of dry docks. Some few years ago a dry dock was commenced by a Mr. Clunis, who had early perceived the advantages possessed by this island for such enterprises. He had made considerable progress with his work when he

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was stopped by the Government, who took possession of the property, owing to Mr. Clunis having failed to possess himself of a proper legal grant of the land. The Government has since built a jetty and coal stores close to the dock, at the north-eastern part of Saga bay, but with the dock itself nothing has been done. Just to the north-eastward of Risim point, the French Government has erected some good coal stores and run out a convenient jetty, off which mooring buoys are placed to secure the vessel to.

SINKI STRAIT, the channel between Ayer Brani and Blakan Mati islands, is not at present used. To render it navigable, it would be necessary to place beacons on the edges of the reefs bounding it; even then it would be hardly safe for sailing vessels, owing to the uncertainty of the direction of the gusts of wind caused by the adjacent high land.

The western entrance of the strait, between the spit off Risim point and the reef fronting Blakan Mati, is quite clear, with depths of 4 and 5 fathoms. Off the south side of the western part of Ayer Brani is a detached reef, dry at low water, and surrounded by a bank which projects more than half-way across the channel towards Blakan Mati, narrowing it to the breadth of half a cable. A tongue with only $2\frac{3}{4}$ fathoms water upon it projects from the west point of Bindarah bay, on Blakan Mati island, nearly to the opposite side of the strait in the direction of Kopih village; a little farther to the west ward the strait is barred across, the greatest depth on the bar being 3 fathoms.

The entrance to this strait from the eastward is between Teregeh and Berala spits, where it is about a cable wide, with depths of 7 to 12 fathoms; within Teregeh and Berala points the depths decrease to 7, 6, and $4\frac{1}{2}$ fathoms.

BRANI SHOALS lie at the eastern entrance of New harbour, between Pagar point and Ayer Brani island. They extend, under a depth of 3 fathoms, about half a mile N.W. by W. and S.E. by E., and from their south-east extreme Teregeh point bears S.W. by W., and Pagar point N. $\frac{1}{4}$ W.; from their north-west extreme the eastern part of Teregeh point bears S. $\frac{3}{4}$ E., and Pagar point N.E. by E. $\frac{1}{2}$ E. The least water upon these shoals is 10 feet, this part being near their centre, and in length it is about 2 cables, and from a few yards to half a cable wide. The channel on their eastern side is marked by three white buoys, one near their south-east extreme, one near their middle, and the other half a cable inside their north-west end.

A white buoy is also moored in 3 fathoms on the south-west edge of Brani shoals, with the end of Pagar sea wall bearing E.N.E. 4 cables.

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The soundings decrease gradually towards these shoals, and if the lead be properly attended to, it will show when a vessel is nearing them.

TIMBAGA ROCKS and SHOAL.—The Timbaga rocks, dry at low-water springs, lie between Pagar point and the shoalest part of the Brani shoals; they are about half a cable long N.W. by W. ¼ W. and S.E. by E. ¼ E., but only a few yards broad. Two red beacons mark these rocks, one on either extreme.

The Timbaga shoal, about half a cable in extent, and with only 9 feet least water over it, lies about a cable north-westward of the Timbaga rocks, and its north-western end is marked by a black buoy.

Both of these dangers are bold, having depths of 4 and 5 fathoms very close to them.

South Channel lies between Brani reef and Brani shoals, it is about 6 cables long and three-quarters of a cable broad, with depths of 3 to 10 fathoms.

Middle Channel, between Brani shoals and Timbaga rocks, is about one cable broad, with depths of 3 to 8 fathoms.

North Channel, between Timbaga rocks and Tanjong Pagar, is nearly a cable broad, with depths of 4½ to 10 fathoms. A red buoy lies in 4 fathoms, S. by E. 115 yards from the end of Pagar sea wall, and a white mooring buoy nearly in mid-channel, abreast Timbaga south beacon.

Anchorage.—The general depths in New harbour are 6, 7, or 8 fathoms, but the bottom is foul and rocky and very indifferent holding ground. Staff Commander Richards, R.N., who surveyed this harbour in H.M.S. *Saracen*, which vessel remained at anchor there for 3 months, remarks:—The holding ground is bad, and great care is necessary to prevent fouling the anchors; vessels remaining more than a day should moor." The best anchorage is considered to be off the French Naval coal shores.

Caution.—Vessels are not permitted to anchor in the fair channel through New harbour, except for such length of time as may be necessary, preparatory to dropping alongside or moving from the wharves.

TIDES.—It is high water, full and change, at the Peninsular and Oriental Company's wharf, at 9h. 45m.; springs rise 10 feet, neaps, 7½ feet. During the north-east monsoon the day tide rises the highest, and in the south-west monsoon the night tide. The low water at Singapore is affected by a large diurnal inequality, amounting at times to 6 feet. The ordinary rate of the tide at springs is 2¼ knots, but it is much influenced by the prevailing monsoon, and often runs 4 knots at the springs. During the north-east monsoon the stream sets to the westward 18 hours in the 24 during spring tides, and almost continuously during neaps.

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The following remarks on the tides of New harbour and Signapore roads are by Captain H. T. Marshall, superintendent of the Peninsular and Oriental Company, 1856:—The irregularities of the tides are very great, so that no dependence can be placed on them from one day to another; for although a tide may rise 8 feet one day, it may increase to 12 feet the next, and the contrary. Again, the night tide may be the lowest in one 24 hours,—and in the next the morning tide. During the north-east monsoon and neap tides, although the water rises and falls, yet the stream continues to run to the westward, sometimes for two, three, or four days consecutively: other times it may be as many days quite still; or a rush of water will flow into and out of the harbour at the rate of 3 and 4 knots. All these fluctuations occur most frequently during the north-east monsoon, and depend chiefly on the force of the wind in the China Sea, yet they sometimes do happen in the south-west monsoon, without any apparent cause.

DIRECTIONS.—Vessels proceeding into New harbour through the western entrance, which is only about one cable across, should keep in mid-channel, observing that the conspicuous red bluff forming Tereh point kept well open of the Peninsular and Oriental Company's jetties, and bearing E. ½ N., will lead clear of the 19 feet patch outside the harbour, also of Berlayer rock, and the reef extending from the south end of Hantu, on which there is a white beacon. Keppel rock will be avoided if St. James mound be not shut in behind the east extreme of the Peninsular and Oriental Company's jetties; and after passing the Meander shoal, which should be given a good berth, the eastern mooring buoy off the Peninsular and Oriental wharf may be passed on either side, but it is better to pass tolerably close-to on the south side, when a vessel may anchor in 6 or 7 fathoms abreast of the French Naval coal stores.

Horsburgh gives the following directions for vessels bound from the eastward to the western entrance of the New harbour:—Pass southward of St. John, and Pulo Soobur, or Sisters isles, giving them a berth of half a mile to avoid a shoal patch of 18 feet, leaving Middle island to the westward, about 1½ miles. Rather less than a mile off the south-east part of Middle island is a detached ledge of rocks (page 94), with an 8 to 12 fathoms channel between it and the island. Pulo Jong, 75 feet high, open of the east end of Middle island N.W. ½ W., just clears it; then steer about N.W. by N. 3 miles in 9 to 13 fathoms, guarding against Terumbo Sileegee shoal lying N.W. ¾ N. distant one mile from Pulo Soobur, the only danger on the eastern side of the passage. The islands bounding the western side of the channel may be approached to half a mile, or less if necessary. In the fair channel the general depths vary from 10 to 17 fathoms. The tides are very irregular in the passages among these islands, running sometimes 4 miles an hour at springs.

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Vessels proceeding from Singapore roads into New harbour, should steer about S.W., according to their draught, not approaching Malang or Malay point nearer than a mile, nor hauling to the westward until mount Faber flagstaff is in line with the left corner of a conspicuous red tiled, white house bearing W. by N. ½ N., which clears the shoal spit off Malay and Pagar points. In rounding these points the fishing stakes furnish a ready guide to vessels, the outer ends of the longest lines of stakes having 3 fathoms water close to them, increasing at a short distance to 5 and 7 fathoms. Having rounded Malay and Pagar points, steer to the westward until the two red beacons on the Timbaga rocks are in line, bearing N.W. by W. ¼ W., and observing that Teregeh point, the south-eastern extreme of Ayer Brani island, must not be brought to the westward of W. ½ S., which clears Berala spit and the northern part of the Buran Darat, and remembering that the north-eastern extreme of the latter is marked by a white beacon.*

To proceed through the North channel, steer about N.W., and passing about half a cable westward of the outer, or south-easternmost of the two red beacons which mark Pagar spit, open the Timbaga rock beacons on the port bow and pass in mid-channel between those beacons and the inner or north-western beacon of Pagar spit. Continue on a N.W. by W. course, according to circumstances, leaving the black buoy on the Timbaga shoal about half a cable on the port hand, and edging to the westward as convenient when Pulo Silugu, a small round island with a bungalow on its summit, is seen just open of the red cliffs of Tereh point, which mark clears the north-west extremes of Timbaga and Brani shoals.

It should be remembered when passing between the north-western extremes of the shoals just mentioned and the coral bank which extends 1½ cables from the shore of Singapore island, and uncovers at two-thirds ebb, that the edge of the latter is marked by a red beacon, about midway between the extremes of the jetties; close to this beacon are 3 and 4 fathoms water.

To proceed through the Middle channel after having rounded Malay and Pagar points, and brought the beacons on the rock in line, steer about N.W. by W. ½ W. until Mount Faber flagstaff is in line with the left corner of the white house bearing W. by N. ½ N. which will lead about half a cable to the westward of them, and also of the black buoy on Timbaga shoal, and about midway between the latter and the white buoy on

* Staff Commander J. Richards observes, that owing to the strong tides and to the hard bottom, the floating beacons frequently break adrift, so that no dependence can be placed upon them; he therefore recommends strangers to take a pilot.

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the north-east extreme of Brani shoals, in depths of 6 to 4 fathoms, deepening to 6 and 7 fathoms as Pulo Silugu comes open of the red cliffs of Tereh point; when steer West and W.S.W. to pass mid-channel between the jetties and Tereh point, leaving the red beacon and mooring buoys on the starboard hand, when a vessel may anchor as convenient off the French Naval coal stores.

Navigating Lieutenant W. H. Stephens, H.M.S. *Thalia*, 1875, remarks: —That vessels from the eastward proceeding alongside the wharf, during a strong flood tide and north-east wind, should, when abreast the second mooring bollard on the jetty and about half a cable off, let go the port anchor and swing around stern to the northward, when the eddy setting up inshore as far as Tereh point, will assist in checking the vessel's way and getting alongside the wharf.

SINGAPORE TOWN AND ROADS.

SINGAPORE.—The town of Singapore is built on each side of the Singapore river, a small stream, only navigable for boats, the entrance of which lies N. by E. $\frac{3}{4}$ E., nearly a mile from Malay point, and W. by S. $\frac{1}{4}$ S. nearly $2\frac{1}{2}$ miles from Tanjong Catong. The commercial part of the town is on the south side of the river, the bank on that side being lined with quays and godowns for the landing and reception of merchandise. The river is usually crowded with cargo boats and many other descriptions of small craft on their way to and from the ships in the harbour, presenting a scene of extraordinary bustle and activity. Singapore is a free port there are no harbour or tonnage dues.

Fullerton battery, in lat. 1° 17′ 20″ N., long. 103° 51′ 18″ E., stands on the southern part of the entrance to Singapore river. It is important from being the point to which it has been customary of late years to refer the meridian distances obtained in Her Majesty's surveying and other ships employed upon the station. A handsome line of godowns erected to the southward of the battery, upon some land which was reclaimed from the sea for that purpose. These buildings very much improve the sea front of the town, and are conspicuous as it is approached from the eastward.

The principal landing place is at the Dalhousie pier, a structure of stone and wood on the northern side of the entrance to the river, projecting over the flat which extends from the shore some distance to seaward. An obelisk stands near the inner end of the pier, and around it are four *red* lights, which serve to point out the position of the landing place at night. A *white* light is shown on the outer end of the pier. Close to the left of the obelisk, (as viewed from seaward,) are two fine buildings; the one standing

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back is the court house, and that nearer the sea, the town hall. Farther to the left is the post office, a very mean looking building, and still farther to the left, on the bank of the river, is the office of the master attendant.

On the right of the obelisk, the esplanade, a grass enclosure surrounded by a carriage drive, extends along the sea front for the distance of a quarter of a mile, and the drive round it is the fashionable resort of the European residents in the cool of the evening. Behind the esplanade are three large buildings, the two farthest to the left are used as hotels, and the third is the masonic hall. To the right of these buildings stands St. Andrews church, one of the finest ecclesiastical structures in India, built after the model of Netley Abbey; the church has a fine tower, surmounted by a lofty spire, which is very conspicuous when viewed from seaward. To the right of the church is a very large building, the Raffles Institution; extending from which in the same direction are a number of handsome detached houses, standing in gardens. Beyond this line of houses, is an extensive native town, the greater part of which is hidden by the sandy point, named Tanjong Rhoo.

The above is a brief description of the most prominent objects seen along the shore of Singapore bay, when viewed from the anchorage.

Imports and Exports.—The free port of Singapore, which ranks as the third port in the commerce of India, was founded in 1819 by Sir Stamford Raffles, who had the sagacity to perceive that from its central geographical position, on the direct route between India and China, and but 40 or 50 miles out of the direct route between Europe and China, it could not fail to become a place of great commercial importance. The rapid growth of Singapore has, however, exceeded all expectation, and the following statistical accounts of imports and exports from 1833–63 have been extracted from a published work* to give, as briefly as possible, a general idea of the magnitude and character of the trade of this important settlement:—

	1833.	1843.	1853.	1863.
Imports -	£2,043,000	£2,953,000	£3,488,000	£6,462,000
Exports -	1,705,000	2,595,000	3,027,000	5,555,000
Total -	£3,748,000	£5,548,000	£6,515,000	£12,017,000

The total in 1875, amounted to £18,142,559.

The chief imports are:—

From Europe and North America: Treasure, cotton manufactures, woollens, beer and wines, arms and ammunition, iron and ironwork, copper and yellow metal, lead, earthenware, and canvas.

* Our Tropical Possessions in Malayan India, 1865, by Jno. Cameron, F.R.G.S.'

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From Calcutta: Opium, grain, saltpetre, gunnie bags.

From China: Gold bars and dust, sycee silver and dollars, china cash sugar, tea, camphor, cassia, alum, raw thread, silk, tobacco.

From the Dutch ports in Java: Treasure, tobacco, rice, pepper, gambier, coffee, cottons, birds' nets, cloves, cassia, cinnamon, other spices.

From Borneo: Unprepared sago, antimony ore, rattans, gutta percha from Sarawak, and coals from Labuan.

From Celebes: Sandal wood, sapan wood, coffee and gutta percha, the products of the island, and of mother of pearl, bartered for with the natives of New Guinea and other islands to the south east of the Archipelago. Birds' nests and a small quantity of bees-wax also form items of importation from Celebes.

From Sumatra: Pepper, sago, coffee, gutta-percha, gum benjamin, gum elastic, and ivory.

From the Malayan peninsula: Chiefly rice, gutta-percha and tin; small supplies of ivory, horns, hides, and birds' nests.

From Australia: Chiefly horses, bread-stuffs, coals from the mines at New South Wales, and sandal wood from Western Australia.

The chief articles of export are:—Gambier, tin, sago, tapioca, black pepper, tortoise shell, mother of pearl, gutta percha, nutmegs and mace, camphor, white pepper, gum elastic, coffee, sapan wood, sticklac, rattans; and most of the articles enumerated among the imports.

Shipping.—From the 1st of May 1862 to the 30th of May 1863, 1,279 square-rigged vessels of 471,441 aggregate tonnage, arrived at Singapore. Of the junks and trading prahus which frequent the port, no very reliable records are kept; but about 200 arrive annually, and it is estimated that they carry about an eighth part in value of the yearly trade.

During the year 1875, 10,473 vessels of 2,204,875 aggregate tonnage, arrived at the Straits Settlements.

Revenue.—The total amount of the revenue from all sources between the 1st May 1863 and 30th April 1864, was 191,909*l.*

The revenue of the Straits Settlements in 1875, amounted to 327,006*l.*

The Population of Singapore may be set down roughly at 90,000. The census of 1871, necessarily in such a country a very imperfect test, made it to be 87,500. The following are the chief statistics of the census: Malays, 19,200; Chinese, 54,000; Natives of India, 13,300; Europeans 900.

Communication. — There is a weekly communication between Singapore and England by the Messageries Maritimes Company's mail steam vessels, viâ Marseilles; and by the Peninsular and Oriental Company's steam vessels, viâ Brindisi. There is also regular communication by

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steam vessels between Singapore, Ceylon, Calcutta, Batavia, Hong Kong, and to the eastern ports of Australia by way of Torres strait.

Telegraph. — Singapore has telegraphic communication by submarine cable with Madras viâ Penang ; Australia viâ Batavia ; and Hong Kong viâ Saigon.

SINGAPORE ROADS* are on the southern side of Singapore island, their limit being defined by a line drawn from the obelisk on Tanjong Catong to the south-east extreme of Peak island (*see* page 94). The limits of Singapore harbour, defined by the Colonial Government, 21st June 1877, are comprised within the lines joining the obelisk on Tanjong Catong and Peak island, the north-west extreme of Peak island, and south extreme of Blakan Mati ; the east and north coast of Blakan Mati, and the coast from Berlayer point to the obelisk on Tanjong Catong.

OUTER BANK and SHOAL.—A mud-bank, with general depths of 10 to 4 fathoms over it, extends across the outer roads of Singapore, from St. John islands to abreast of Tanjong Catong, where it takes the direction of, and fronts the coast some distance to the north-eastward.

The least water on this bank is about the middle of it, and it is this part which is generally known as the Outer shoal, which is $1\frac{1}{2}$ miles long N.E. and S.W., a cable broad at its northern, and nearly half a mile broad at its southern end, having depths of 4 to $4\frac{3}{4}$ fathoms over the greater part of it, but some patches of $3\frac{1}{4}$ and $3\frac{1}{2}$ fathoms near its southern extreme.† From the north-east end of the shoal, in 5 fathoms, the obelisk on Tanjong Catong bears N. $\frac{3}{4}$ E., fort Canning flagstaff is just to the northward of the obelisk on the Dalhousie pier N.W. by W. nearly, and Peak island bears S.S.W. $\frac{1}{2}$ W.; from its south-eastern extreme fort Canning flagstaff bears N.N.W. $\frac{1}{4}$ W., and Peak island S. by W. $\frac{1}{3}$ W.; and from its south-western extreme the same flagstaff bears N.N.W., and Peak island S. $\frac{1}{4}$ W.

Fort Canning flagstaff open northward of Dalhousie pier, bearing N.W. by W. $\frac{1}{4}$ W., will lead clear of the north end of the Outer shoal; Peak island S.W. by S. will lead eastward of it ; and the southern extreme of Blakan Mati island S.W. by W. $\frac{1}{2}$ W. will lead westward.

North-eastward of the Outer shoal the bank is not quite three-quarters of a mile broad, with depths of 6, 7, and 8 fathoms over it. South westward of the outer shoal the soundings on the bank are not so regular, and

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* *See* Admiralty plan :—Singapore roads, No. 1,995, scale, $m = 6$ inches.

† This bank is shoaling rapidly. In 1846, when surveyed by Mr. Thompson, Government surveyor, the general depths upon it were $5\frac{1}{2}$ and 6 fathoms, and the least water $4\frac{1}{2}$; in 1867 the general depths were but 4 and $4\frac{1}{2}$ fathoms, and the least water $3\frac{1}{4}$ fathoms.

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a hole of deep water half a mile long runs into the bank in a north-westerly direction about three-quarters of a mile from St. John islands.

A small patch, about 2 cables in extent, having 4 fathoms least water over it, lies about a third of a mile south-westward of the Outer shoal, and from its centre fort Canning flagstaff bears N.N.W.-northerly, Peak island S. ¾ W., and mount Serapong W. by N. ¼ N. Mount Serapong bearing W. ¾ N. leads between this patch and the Outer shoal, and bearing W. by N. ¾ N. leads to the southward of it.

Peak island bearing S.W. leads just ouside the 10-fathoms line at the edge of the bank in from 11 to 13 or 14 fathoms; the soundings quickly deepening to 17, 20, 25, and 30 fathoms south-eastward from the middle and southern part; and to 17 and 20 south-eastward from the northern part of the bank.

Inside the Outer shoal are 10 to 12 fathoms, mud, decreasing gradually to 7 or 6 fathoms, but shoaling suddenly from a depth of 5 to 4 or 3 fathoms; when fort Canning flagstaff bears to the northward of N.W. by W. ½ W., caution is necessary in large vessels anxious to get as close in as possible. With fort Canning flagstaff to the westward of N.W. by W. ½ W., the soundings decrease much more regularly. The 2-fathoms line extends nearly half a mile south-eastward of Fullerton battery, and nearly three-quarters of a mile from the depth of Singapore bay. The extremity of the north-eastern line of fishing stakes marks the 3-fathoms edge of the shore bank, eastward of Malay point.

Near the north-eastern extreme of the Buran Darat reef, is a run of deep-water—12 to 23 fathoms—which terminates about half a mile E.S.E. from Malay spit.

BURAN DARAT is the name of an extensive coral reef which uncovers at two-thirds ebb, and fronts the eastern shore of Blakan Mati island, being separated from the shore reef by a narrow channel, with depths of 4 to 8 fathoms in it. The reef is about a mile long, N.E. by N. and S.W. by S., a quarter of a mile broad at the northern end, and terminates in a point at its southern extreme. There is a detached patch with 1½ fathoms on it, and 3¼ to 4 fathoms close around, lying about a cable to the northward of the north edge of the reef; but Teregeh point bearing W. ½ S. will lead to the northward both of this patch and Berala spit.

The north-eastern extreme of Buran Darat is marked by a white beacon, from which Berala point bears W. ¼ N., distant nearly two-thirds of a mile, and the hill over Pagar point N.N.W. westerly.

PAGAR and MALAY SPITS.—A mud and sand flat, with several patches of rocks upon it, and which dries at two-thirds ebb, fronts the small bay between Pagar and Malay points, projecting in a south-easterly direction, to the distance of a third of a mile. That part of the

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bank which extends from Pagar point is known as Pagar spit, and that extending from Malay point as Malay or Malang spit. Shoal water, under 3 fathoms, extends some distance outside the flat, and its edge is marked by several lines of fishing stakes.

A sea wall has been constructed from Pagar point to the extremity of Pagar spit, which is marked by a red beacon.

MALAY or Malang point, the south-western limit of Singapore roads, bears S.W. by W. $\frac{1}{4}$ W. nearly 3 miles from the obelisk on Tanjong Catong, and S. by W. $\frac{3}{4}$ W. nearly a mile from the entrance of Singapore river. The land from Malay point takes a south-westerly direction for nearly half a mile to Pagar point, and then trends to the westward, forming the northern shore of New harbour.

SHORE FLAT.—A mud-flat fronts the whole shore of Singapore roads from abreast of Malay point to Tanjong Catong. In front of the esplanade it extends rather more than a cable ; in front of Fullerton battery and the new godowns, not more than half a cable, but in the bay to the southward, towards Malay point, its distance from the shore is nearly 2 cables.

FORT CANNING.—Rising abruptly behind, and overlooking the town of Singapore, is a hill 156 feet high, upon which formerly stood a large bungalow, the residence of the governor; now, however, the crest of the hill is covered by a large fort, which has been named fort Canning, in honour of the late Viceroy of India. Near the middle of the fort is a flagstaff, crossed with two yards, which is used during the day to signal the arrival of ships.

LIGHT.—A *fixed* white light is exhibited from the flagstaff in fort Canning, at an elevation of 226 feet above the level of the sea, and in clear weather it is said to be visible at 15 miles, between St. John islands and Johore shoal.

TANJONG RHOO, or Sandy point, is the extreme of the land extending $1\frac{3}{4}$ miles West from Tanjong Catong, and forming the northern shore of Singapore roads. It bears N.E., a little over three-quarters of a mile from the entrance of Singapore river, and is separated from the western shore of the bay by a channel a quarter of a mile wide, in which there are but 3 to 7 feet water at low spring tides.

Inside Tanjong Rhoo is an extensive shallow lagoon, convenient for the anchorage of boats and native craft, and very many such are to be seen there at certain seasons. Some shipwrights' yards are now established at this point, and many small vessels go there to be repaired.

TANJONG CATONG, or Deep-water point, forming the north-eastern boundary of Singapore roads, lies N.N.E. $4\frac{1}{2}$ miles from St. John islands. The obelisk, which marks the harbour limit in this direction, stands about a cable westward of the point. The coast for some distance

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to the westward of Tanjong Catong, is low land, covered with cocoa-nut plantations.

SAND-BANKS.—Lines of fishing stakes extend from the coast about Tanjong Catong, over the shallow bank fronting the coast, and close to the ends of the stakes are 6 and 7 fathoms water, but these soundings are in a narrow run of deep water, behind the harbour bank, the 5 fathoms line at the edge of which is about three-quarters of a mile distant from the point.

Between the deep water close to the point, and the 5-fathoms line outside of it, are several patches with but 15 and 16 feet water over them, and 2 patches with as little as 12 feet. One of the latter lies S.E. by E. ½ E. from the obelisk, distant half a mile from the nearest shore and the other S. by W. ½ W. nearly three-quarters of a mile from the obelisk.

These shoals will be avoided by keeping mount Serapong westward of S.W. by W. ½ W. until the flagstaff on fort Canning bears W. by N. ½ N.; or by not shoaling under a depth of 6 fathoms towards them.

LIGHTS.—*Red* lights are exhibited during the night from the extremities of the fishing stakes.

ANCHORAGE.—The trade of Singapore is now so considerable that a large number of vessels are always to be found anchored in the roads within the harbour limits, and small vessels may run in, guided by their soundings, and anchor where they can find a convenient berth.

Vessels of large draft must be more cautious, on account of the soundings decreasing suddenly from 5 to 4 and 3 fathoms. Good, safe anchorage, in from 7 to 10 fathoms water, will be found with the flagstaff on fort Canning between the bearings of W. by N. ½ N. and N.W. ½ N., and with mount Serapong bearing S.W. by W. ½ W., or the left extreme of Blakan Mati S.W. ½ W.; the latter bearing places a vessel a little farther in, and is useful when the flagstaff is to the westward of N.W. by W.

The most convenient anchorage for a large man-of-war—the ship of the senior naval officer for instance—and the nearest to the shore, is with the flagstaff on fort Canning in line with the obelisk on the pier, and the left extreme of Blakan Mati island bearing from S.W. ½ W. or S.W. ¼ W. —but nothing to the southward of the latter bearing; or the obelisk on Tanjong Catong from N.E. by N. to N.E. ¾ N.—but nothing to the eastward of the latter bearing. She will then be in 9 fathoms, but only a little more than 2 cables from the 3-fathoms edge of the bank, not quite 1½ miles from the landing place, and in a good position for boarding new arrivals, &c.

To indicate the man-of-war anchorage, a red buoy is moored in 10 fathoms, with Tanjong Catong obelisk bearing N.E. ¾ N.; fort Canning

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flagstaff in line with the obelisk on the pier; and the white beacon on Buran Darat in line with the south-east extreme of Blakan Mati island.

DIRECTIONS.—When bound to the roads from the westward, and having rounded Peak island at the distance of about 2 cables, steer N. by E. or N.N.E. according to the tide, across the Outer shoal for the anchorage. A large vessel wishing to avoid the Outer shoal may steer to the northward with Peak island bearing between South and S. by E.,—but nothing to the eastward of the latter bearing,—until the left extreme of Blakan Mati bears S.W. by W. ½ W., which bearing kept on will lead north-westward of the Outer shoal, and then steer as convenient for the anchorage.

In working towards the dangers between St. John islands and Blakan Mati, care must be observed not to bring Peak island east of S. ½ E. while mount Serapong is north of W.N.W.; but when mount Serapong is west of W.N.W., a vessel may stand on until the western extreme of West St. John island bears S. by W. ½ W. The shoalest spots on the Outer shoal will be avoided by not bringing Peak island west of South, after the south extreme of Blakan Mati bears W. by S. The fishing stakes will give warning when a vessel is standing towards the Pagar and Malay spits. The south extreme of Blakan Mati, if not brought west of S.W. by W. ½ W., will lead clear of the inner side of the Outer shoal; and large vessels, not wishing to stand over this shoal when outside of it, should not bring Peak island south of S.W. by S.

Small vessels bound to Singapore roads from the eastward will have no difficulty, as they have merely to proceed to a convenient anchorage. Those drawing between 12 and 16 feet may pass inside the shoals off Tanjong Catong, by keeping in the run of deep water, pretty close to the end of the lines of fishing stakes which extend out from the point; but vessels of larger draft had better keep outside those shoals.

It is often advisable for vessels, and the usual custom for those belonging to the port, to keep the Singapore shore well aboard when proceeding to the anchorage from the eastward, especially when the wind is off the land and the tide setting to the westward. It will then, however, be very necessary to be guarded as Tanjong Catong is approached, and vessels of large draft must be very careful not to bring mount Serapong (on Blakan Mati island), to the southward of S.W. by W. ½ W., until the flagstaff on fort Canning bears W. by N. ½ N., or to avoid getting under a depth of 6 fathoms towards the Tanjong Catong shoals.

A vessel of large draft will pass north-eastward of the Outer shoal and not have less than 5 fathoms water, by keeping the flagstaff between the bearings of W. by N. ½ N. and N.W. by W., and she should be prepared to anchor directly mount Serapong bears S.W. by W. ½ W., or the left extreme of Blakan Mati S.W. ½ W., inside of which vessels of heavy

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draft should not go; but those drawing not more than 18 or 20 feet may go a cable or so farther in, and have 4 or 5 fathoms.

SOUTH SHORE OF EASTERN PART OF THE STRAIT.

This part of Singapore strait from Pulo Blakan Padang, Pulo Sambo, and adjacent islands and reefs, is formed by Pulo Battam an island of considerable size lying on the west side of Rhio strait, and by the larger island Pulo Bintang on the east side of Rhio strait.

PULO SAMBO the larger of two islands which form the western limit of Battam bay, is separated from Pulo Blakan Padang (see page 88) by a channel nearly half a mile wide having depths of 5 to 15 fathoms. Pulo Sambo is nearly a mile long, and a quarter of a mile broad, and is encompassed by a belt of coral, about a cable broad in most places.

Little Sambo Island and Ledge.—Little Sambo, about one-third of the size of Pulo Sambo, lies one-third of a mile north-westward of it; and is nearly everywhere fringed with coral, extending to a short distance, but from the north-west point it stretches off 3 cables; this part is known as Sambo ledge, and has a rock always uncovered near the middle.

Batu Beranti is a rocky ledge, one-third of a mile in size, the centre of which is above water, and lies 6 cables N. by W from Little Sambo.

Another ledge, similar to that just described, lies a third of a mile westward of it, and three-quarters of a mile from Little Sambo.

The soundings near these dangers are irregular, and afford no reliable guide for a vessel approaching them; close to are 7 to 15 and 19 fathoms, and a short distance to the eastward are depths of 32 and 54 fathoms.

Tanjong Pingee, the north-west point of Battam bay, lies about 1¼ miles S.E. from Pulo Sambo; coral extends from the point about half a cable in places.

Pulo Mariam is an islet two cables south-eastward of Pulo Sambo and three-quarters of a mile north-westward of Tanjong Pingee. The channel between the islet and Tangong Pingee, is encumbered near the middle with three patches of dry reef and some shoal soundings. There is, however, a deep but very narrow passage between Tanjong Pingee and these dangers, and a similar passage between them and Pulo Mariam; there is also a passage between the islet and Pulo Sambo.

BATTAM BAY is nearly 7½ miles wide, and 2 miles deep, being bounded to the westward by the two Sambo islands, and to the eastward by the peninsula of which Siquang point is the north-west extreme.

The soundings in the outer part of the bay vary from 10 or 12 to 18 or 20, or even 31 fathoms; but very close to the reefs extending from the

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shores, are 6 to 8 fathoms, so that a vessel should be cautious in approaching them.

The depth of Battam bay is at its eastern part, between Tanjong Pingee and the south-west extreme of Siquang point, and is formed by the coast trending in an easterly direction for about 4 miles from Tanjong Pingee, and thence to the northward for about 2 miles.

Three rivers fall into this part of the bay; Songie Mentaru, Songie Ladi, and Songie Jodu, the two latter are separated by Tanjong Oma, a strip of land three-quarters of a mile wide, having a hill near the point; the western river, Songie Mentaru, is 1½ miles westward of Songie Ladi, the north point of the land between being named Tanjong Liengsy.

Pulo Dangas is an islet on the south shore of Battam bay, close to a projecting point situated 1¼ miles east of Tanjong Pingee, which divides the coast line between Tanjong Pingee and Pulo Bokok into two small bays. The bay between this islet and Pulo Bokok, is free from danger, and the shore reefs extend off but a short distance; vessels may, therefore, safely anchor there in about 5 fathoms water. The bay westward of Pulo Dangas is filled with coral which extends about a quarter of a mile from that island in a north-westerly direction; thence nearly straight to Tanjong Pingee.

Pulo Bokok, or Mangrove island, 4 cables in diameter, lies about that distance off Tanjong Liengsy, on the southern shore of the bay, and 1½ miles east of Pulo Dangas; it is encompassed by the coral reef projecting from the shore, which extends about 1½ cables from it.

Jodu bay is the name of the anchorage off the two small rivers Jodu and Ladi, in the depth of Battam bay. It is bound to the westward by Pulo Bokok, and to the eastward by two small reefs, dry at low water, which lie off the entrance of Songie Jodu, a third of a cable outside the shore reef which fringes the whole coast line from Siquang point to Pulo Bokok, and obstructs the mouths of all the rivers.

Vessels should enter the anchorage with the hill over Tanjong Oma bearing about S.E., and anchor in 5 or 4 fathoms when they near a line connecting the south-west part of Siquang point with Pulo Bokok, about 4 cables from the latter. Caution must, however, be observed, as the soundings decrease suddenly from 7 to 4 and 3 fathoms towards Pulo Bokok, but more regularly towards the shoals on the opposite side of the bay.

SIQUANG POINT and TANJONG PENGAIR are, respectively, the north-west and north-east extremes of a peninsula which projects from about the middle of the north coast of Battam, separating Battam and Boelang bays. The land in the vicinity consists of moderately elevated hills, and the coast line is fringed with coral extending one or 2 cables off, near the edge of which are irregular depths, of 6, 8, and 11 fathoms.

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BOELANG BAY, situated about 2 miles to the eastward of Battam bay, is $2\frac{3}{4}$ miles wide at its mouth, between Tanjong Pengair on the west, and Tanjong Pekapu on the east, and $2\frac{1}{8}$ miles deep, narrowing towards its head, into which fall the rivers Tring and Belie-an. The shores of the bay are fronted by reefs which extend barely a quarter of a mile from the entrance points, but more than double that distance within them; and from a point a mile south-eastward of Tanjong Pengair, a coral spit, with 15 feet over it, projects in an E. $\frac{3}{4}$ N. direction nearly a mile.

A small detached reef, part of which dries 3 feet, lies at the entrance of Boelang bay, with its outer edge E. $\frac{1}{2}$ N. a mile from Tanjong Pengair. Eastward of this reef the depths are $3\frac{3}{4}$ and 4 fathoms for about a mile, and then 5 and 6 fathoms towards Tanjong Pekapu. Outside the line of the heads the depths are 8 to 11 fathoms, increasing suddenly to 23 fathoms; and between the reef and Tanjong Pengair the depths are 4 to 8 fathoms.

The best anchorage in this bay for vessels of moderate draft appears to be with Pulo Nongsa bearing N.E. $\frac{1}{2}$ E., and the hill over Tanjong Pekapu about East. Small vessels may, with proper attention to the lead and a good look-out, go farther in, about S. $\frac{1}{2}$ W., and anchor in 4 or $3\frac{1}{2}$ fathoms.

Tanjong Pekapu is the north-east limit of Boelang bay, the coast between this point, and Tanjong Batu Bla, at three-quarters of a mile N.E. by E., being fronted by coral extending nearly a third of a mile from the shore.

PULO NONGSA, a small island a third of a mile in extent with a high tree upon it, about a mile to the northward of Tanjong Pekapu, and nearly three-quarters of a mile off Tanjong Batu Bla, the nearest point of Pulo Battam. This island is surrounded by reef, extending about a quarter of a mile from it, between which and the shore reef is a narrow channel having depths of 5 to 13 fathoms. A small islet lies close off its south end.

Pulo Nongsa is rather a conspicuous object when near this part of the strait, and if kept open of Tanjong Boerang will lead a ship clear of Little Pan reef (*see* page 351).

Rosa rock, nearly a mile E. $\frac{1}{2}$ N. from Pulo Nongsa, and 2 cables to the northward of the shore reef extending from Tanjong Boerang, dries at low water, with 10 to 12 fathoms close to its north side.

TANJONG BOERANG, or Nongsa, the most northern point of Pulo Battam, lies nearly a mile north-east from Tanjong Batu Bla, the coast between forming a bay, in which, on the banks of a small stream, is the Malay village of Nongsa. This bay is filled with coral (dry at low water), the edge of which extends half a mile from the shore as for as Tanjong Boerang. From the east side of Tanjong Boerang the shore reef does not extend farther out than 2 cables, thence to Tanjong Bombang (the north-east extreme of Pulo Battam), a distance of about

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3 miles in a S.E. by E. direction, it projects three-quarters of a mile from the shore.

PULO BINTANG is the largest island on the south side of Singapore strait; the north side of this island is about 16 or 17 miles in length, nearly E. by N. and W. by S., the greater part being taken up by the large bay of Sumpat; several dangers lie off it, which will be described in detail. Like most of the other land bounding the strait of Singapore, it is covered with trees, and, excepting the hills inland, is not much elevated.

Bintang Great and Little Hills.—Bintang Great hill, in lat. 1° 4½′ N., long. 104° 27½′ E., bearing S. by E. ⅛ E., 16 miles from Horsburgh lighthouse, may be seen in clear weather 40 miles, being 1,253 feet high, and is a good mark in approaching the entrance of the strait from the northward. When viewed from that direction, it shows a saddle-shaped summit; and appearing to adjoin it on the north side, but in reality 3 miles distant from it, is a small conical hill, named False Bintang, or Bintang Little hill, 792 feet high, the summit of which is in line with the saddle of the large hill bearing S. 8° E. When the centre of the saddle bears South (*true*), the summit of the Little hill is just open with the western shoulder of the large hill; and this mark or bearing of Bintang hill is a safe guide to carry a vessel to the eastward of, but near North patch, the outermost of the Romania shoals.

TANJONG SUBONG, the north-western point of Pulo Bintang, lying 13¼ miles E. ½ S. from Tanjong Boerang, Crocodile shoal, and Pan reefs, in the entrance of Rhio strait, are included in the description of that strait (*see* pages 350 and 361).

TANJONG PERJAM.—From Tanjong Subong the coast trends 1½ miles in an easterly direction, thence half a mile in a northerly direction to Tanjong Perjam, which is a point formed by a small hill projecting in a N.N.W. direction from the coast line; the shore reef extends off only a short distance, but a group of islets or large rocks, occupying a space nearly half a mile in extent, lies 4 cables off the pitch of the point.

Pulo Perjam is a small islet situated in the bay between Tanjongs Subong and Perjam, at half a mile S.W. by W. from the latter; there are several large rocks above water extending nearly a mile to the westward of Pulo Perjam; as this bay has not been thoroughly examined, other rocks may exist below water.

LANGUI SHOAL, about a third of a mile in extent N.E. and S.W., and having 10 to 12 feet water, lies E.N.E. 5¼ miles from Crocodile shoal. From its north end, Tanjong Subong—the north-west point of Bintang at the entrance of Rhio strait—bears S.W. ¾ W., 3¾

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miles; Tanjong Batu Sow S.E. ½ E., 1¾ miles; and Horsburgh lighthouse N. by E. ⅔ E., 7½ miles. Close to the northward of this shoal are 5 and 6 fathoms, and 10 to 12 fathoms at a short distance from it; but a bank with 2 to 5 fathoms extends nearly a mile to the south-westward.

These shoals will be avoided by keeping Pulo Kera or Skerrie, which lies on the east side of Rhio strait, open of Tanjong Subong, bearing about S.W. until the small hill over Tanjong Batu Sow bears S.E. by S.

TANJONG BATU SOW and ADJOINING COAST.—Tanjong Batu Sow, a prominent point on the north coast of Bintang, having a small hill over it, lies 2½ miles E. by N. from Tanjong Perjam, and 2¼ miles westward of the western point of Sumpat bay. The coast between the last-mentioned point and Tanjong Batu Sow is fronted by reef to one-third of a mile, within the margin of which, midway between the points, are some rocks several feet above water.

Between Tanjong Batu Sow and a bluff 2 miles W. by S. ¾ S. from it, is a small bay about a mile in depth, the shores of which are fronted by coral, extending half a mile off in some parts. A cluster of islets, or large rocks, lie just inside the edge of the shore reef westward of Tanjong Batu Sow; similar large rocks lie at the western part of the depth of the bay, and others near the edge of the coral projecting nearly half a mile from the bluff which forms its western limit.

Small vessels may anchor in 4 or 4½ fathoms in the middle of the bay, but in entering they must keep nearer the rocks off the bluff than to those off Tanjong Batu Sow, the edge of the shore reef being close to the former, but projecting a quarter of a mile in a south-westerly direction from the latter.

DIANA SHOAL, lying E. by N. ¾ N. 4 miles from Langui shoal, is about half a mile in extent, with 2¾ fathoms water over it, 4 fathoms close around, and 7 to 8 fathoms a short distance from it. From its outer edge the extreme of Tanjong Brakit bears E. ¼ S. 8¾ miles; Tanjong Batu Sow S.W. 3¼ miles; and Horseburgh lighthouse N. by W. ½ W., 5¾ miles.

A little more than half a mile in a W.S.W. direction from this shoal, is a sand patch with 4 and 5 fathoms water; and it seems probable that a bank may extend westward from Diana to Langui shoal, for the chart exhibits in places soundings of 5 fathoms between them, and it is quite possible that other, and perhaps shoaler, patches would be found if the locality were to be more thoroughly sounded. To avoid the Diana shoal, the north extreme of Tanjong Brakit should not be brought eastward of E. ½ S.

TULLOH SUMPAT, or Sumpat Bay, is the extensive bight between the point 2 miles eastward of Tanjong Batu Sow, with two small hills over it, and the western extreme of Tanjong Brakit; the points of the bay lying E. by N. ¼ N. and W. by S. ¼ S., 8¼ miles apart. Its

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deepest part, which is blocked with coral reef extending 1½ miles from the shore, is between the western part of Tanjong Brakit and two points which lie about W.S.W. 6 miles from it, named Batu Scool and Batu Rumput, and one-third of a mile off which are some rocks above water, outside the edge of the shore reef.

Pulo Sumpat, a small island 178 feet high, lying in the eastern part of Sumpat bay, may be readily known by its saddle shape. It lies 2⅓ miles South of the shoal last mentioned, and S.E. ¾ S. 1½ miles from the western extreme of Tanjong Brakit; just outside the edge of the extensive reefs fronting that part of the shore, and filling up the depth of Sumpat bay.

Vessels should not anchor in less than 6 fathoms water, or come inside a line connecting Batu Rumput point with the north-west extreme of Tanjong Brakit.

TANJONG BRAKIT, the north-east point of Bintang island, has some hills on its east side, 217 feet high, and others a mile farther to the southward 267 feet high. Reefs and dangers extend 1⅓ miles from this point, within the margin of which lie the following:—

A doubtful Shoal, apparently about half a mile in extent, having 1½ fathoms water over it, is marked on the chart S.W. by W. ½ W. 1½ miles from Postillion reef, W. by N. ½ N. a little over 2½ miles from Tanjong Brakit, and S.E. by E. 9½ miles from Horsburgh lighthouse. This shoal could not be found by the officers of the *Rifleman*, and tolerably even soundings, 6 to 8 fathoms, were obtained in the neighbourhood; owing to the setting in of the north-east monsoon the search had to be discontinued without the existence of the shoal being completely disproved.

POSTILLION REEF, composed of coral and sand, with 2 fathoms water over it, lies half a mile outside the shore reef extending from Tanjong Brakit; between Postillion and the shore reef there are depths of 4 to 8 fathoms. Depths of 4 fathoms extend more than half a mile from this reef in a north-west direction, but the same distance north and north-east from it the soundings vary from 5 to 8 or 9 fathoms. Horsburgh lighthouse bears from this reef N.W. by W. ¾ W., nearly 10¼ miles.

Black Rock is a dark-coloured rock lying off the north extreme of Tanjong Brakit, distant half a mile from the shore. The shore reef extends some short distance outside this rock, and a tongue of sand, with but 3 fathoms water over it, projects a third of a mile from the outer edge. The outer end of this tongue lies North, distant 1¼ miles from the north extreme of the point.

Pulo Brakit, 30 feet high, is a small island lying half a mile N.N.E. from the northern part of Tanjong Brakit. This island should not be

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approached nearear than three-quarters of a mile, as the shore reef projects nearly half a mile outside of it.

Pulo Coco, 40 feet high, is narrow, and three-quarters of a mile long, it lies close to and appears to form the eastern side of Tanjong Brakit; the island may be approached to a distance of half a mile.

BRAKIT ROCK, discovered in 1861 by Mr. Stanton, commanding H.M.S. *Saracen*, is a cable in length, N.W. and S.E., and half a cable in breath, with two fathoms over it at low water, and 10 to 12 fathoms close-to all round. It lies N.N.E. $\frac{3}{4}$ E. $2\frac{3}{4}$ miles from Tanjong Brakit, and from its southern and shoalest part the northern extreme of Pulo Sumpat appears in line with the apex of Little Bintang hill bearing S.W. $\frac{1}{4}$ S., and Horsburgh lighthouse W. by N. $\frac{1}{2}$ N. 12 miles. A conspicuous double tree on a long hill 4 miles from Tanjong Lokan appears just inside the point bearing S. $\frac{1}{2}$ W. This tree kept well open of Tanjong Lokan bearing S. by W. clears the eastern side; Pulo Panjang peak S.E. $\frac{1}{2}$ S. clears the north-east side; Barbukit hill about four times its own breadth open eastward of Horsburgh lighthouse W. by N. $\frac{1}{2}$ N., will lead to the northward; and Little Bintang hill well open northward of Pulo Sumpat S.W. $\frac{1}{2}$ S. will lead to the westward.

The channel between Brakit rock and Tanjong Brakit is free from danger, with depths decreasing from 13 and 14 fathoms near the rock to 9 and 6 near the reefs which extend from the point. It is not, however, advisable to use this channel except in cases of emergency.

CAUTION.—From the above description it will be seen that the whole of the north coast of Bintang is fronted with dangers, and it is advisable that vessels should not attempt to come inside Diana and Langui shoals, which will be done by keeping Pulo Kera or Skerrie open of Tanjong Subong, until the north extreme of Tajong Brakit bears E. $\frac{1}{2}$ S., and Pulo Sumpat bearing S.S.E. will lead to the westward of the shoals in the vicinity of Pulo Brakit.

NORTH SHORE OF EASTERN PART OF THE STRAIT.

This part of the strait is formed by the south-east part of Singapore island, Johore shoal, and the south-east part of the Malay peninsula. Roumania point the south-east extreme of the Malay peninsula, and the north-eastern limit of Singapore strait, is 17 or 18 miles westward of the meridian of Tanjong Brakit the south-eastern limit of the strait; but the Roumania islands with several rocks and dangers near them, together with the Roumania shoals, North patch, and the Eastern bank, extend nearly as far to the eastward as the meridian of Tanjong Brakit. These outlying dangers will be described in detail; but the following hills, as they form

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convenient landmarks for navigating the strait and for recognising the entrance from the eastward, will be first mentioned.

JOHORE HILL or Maroobukit, 661 feet high, is of a regular, oblong, sloping form, and covered with trees. Standing but a very short distance inland from Tanjong Johore, it is one of the most conspicuous objects in Singapore strait.

LITTLE JOHORE HILL, or Gunong Bow, 749 feet high, lies N. by W. $\frac{3}{4}$ W. $5\frac{1}{4}$ miles from Johore hill. Although higher, this hill is not so extensive as Johore hill, but it is also useful as a landmark.

BARBUKIT HILL, 645 feet high, is nearly $5\frac{1}{2}$ miles W.N.W. from Romania point, and $12\frac{1}{2}$ miles W. by N. $\frac{3}{4}$ N. from Horsburgh lighthouse; it is a regular pyramid rising from the low land, and is a very useful object in making out the entrance of the strait.

FALSE BARBUKIT HILL, 432 feet high, is situated on the coast of the Malay peninsula, 8 miles northward of the entrance of Singapore strait, and 6 miles N.N.E. $\frac{1}{4}$ E. from Barbukit hill; it is a low sloping hill near the sea, appearing like a tope of trees a little more elevated than the adjacent coast, which is all rather low and woody to the northward of the hills over Romania point. It bears W. $\frac{1}{2}$ S. about 17 miles from the centre of the Eastern bank, and N.W. nearly 14 miles from Horsburgh lighthouse, and being discernible during hazy weather much sooner than Barbukit hill, answers as a guide in coming from the northward towards the northern extremity of the outer shoals.

SOUTH-EAST COAST OF SINGAPORE ISLAND.—From Tanjong Catong, the north-east limit of Singapore roads, the coast trends E.N.E. $3\frac{3}{4}$ miles, thence about N.E. $1\frac{1}{4}$ miles to Tanjong Buddoh or Mung guang; about midway between Tanjongs Catong and Mung guang is the village of Siglap, which may be known by two bungalows built on the summits of two hills about a mile inland behind the village. Just to the northward of Tanjong Mung guang there is a slight indentation in the coast line, known as Tulloh Mati Ikan (Dead Fish bay); the coast then trends about N.E. by N. $3\frac{1}{2}$ miles to Tanjong Changhi.

Red cliffs.—The south and south-east coasts of Singapore are level and woody. The most conspicuous objects are the small Red cliffs or Tanah Merah Ketchil, in a small bight in the land, just to the south-westward of Tulloh Buddoh, and the large Red cliffs, or Tanah Merah Besar, about S.W. $\frac{1}{2}$ S. $1\frac{1}{2}$ miles from Tanjong Changhi. The large Red cliffs are visible from a considerable distance to the eastward. Coming from the eastward the small Red cliffs will not open out until the large Red cliffs have been some time in sight.

TANJONG CHANGHI, the north-east extreme of Singapore island, forms the south-east limit of the old strait of Singapore. It is low

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land with a white sandy beach, and bears about W. by N. nearly 6 miles from Tanjong Johore. A shoal bank extends about 2 cables from the point, close to which are depths of 6 fathoms.

A shoal bank fronts the whole of this coast, extending off half a mile from the small Red cliffs, and a mile in a south-easterly direction from the large Red cliffs. The soundings decrease towards it with tolerable regularity, but large vessels should not near it under a depth of 12 or 10 fathoms.

RED CLIFF BANK is an extensive flat of mud and sand, with some patches of rock and coral upon it, extending from the eastern part of Singapore island, between Tanjong Changhi and Tanjong Buddoh. The north-eastern edge of the bank projects about S.E. ½ E. nearly 4 miles from Tanjong Changhi, its extreme forming a horn or spit. From Tanjong Buddoh the bank projects in an easterly direction towards the Johore shoal, which may be considered the outer horn or spit of the bank. These two horns thus projecting from the main part of the bank form a basin between them, in which are depths of 7 to 12 fathoms.

The north-eastern side of this bank forms one side of the channel leading to the Old strait of Singapore and the main entrance of Johore river. In proceeding through this channel, Tanjong Changhi, if not brought north of N.W. ¾ W., appears to lead clear of the edge of the bank, in not less than 3¾ fathoms, until within half a mile of Tanjong Changhi, when a vessel should steer to round the point at about a quarter of a mile distance; but the chart exhibits but few soundings near the north-eastern edge of the bank, and therefore proper caution should be observed in standing towards it.

JOHORE SHOAL, or Allang Bau, which fronts the entrance of the Old strait of Singapore, is about 2 miles long East and West, nearly a quarter of a mile broad, and is composed of hard sand, having 1¼ fathoms on its shoalest part at low water, and 2 to 3 fathoms elsewhere. Soundings of 3½ to 5 fathoms extend about a mile to the eastward of it, and rapidly increase from 7 to 16 or 19 fathoms; and close to the south and south-west sides are 8 or 9, deepening at a short distance to 11 or 13 fathoms.

From three fathoms on the east extreme of the shoal, the south end of St. John island bears S.W. by W. ⅝ W.; Little Johore hill North; Johore hill N.N.E.; South point E. by N.; and it is 3¼ miles distant from Tanjong Johore, and about 6½ miles from the east part of Singapore island.

South Romania island open of South point leads clear to the southward of this shoal; and when coming from the eastward it may also be avoided by not approaching the north shore under a depth of 13 fathoms after Johore hill bears north, or Barbukit hill N.E. ¾ E. Coming from the

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westward, St. John island should not be brought to the southward of W.S.W., after little Johore hill bears N. by E., or Johore hill N.E. by N., nor the shoal neared under a depth of 13 fathoms until Johore hill bears North.

There is no safe passage for vessels of large draft between Johore shoal and the eastern extreme of Singapore island, although there are one or two narrow channels with depths of 3½ and 4 fathoms between the patches which connect Johore shoal with Red cliff bank.

JOHORE CHANNEL, leading to the mouth of the Johore river, is between the dangers extending to the southward of Johore shoal and Tanjong Johore. It is about 2½ miles wide, with 17 or 16 fathoms, close to the shoal, and 12 or 11 fathoms in about mid-channel, decreasing to 9 fathoms towards Tanjong Johore; but there is a bank of 5½ and 6 fathoms about a mile south-westward of the edge of the tongue outside the Malang Berdaun rocks, with depths of 12 to 17 fathoms between.*

JOHORE RIVER.—Qualla Johore, or mouth of the Johore river, is bounded on the east side by the bank surrounding the south and west sides, and extending to the northward of Tikong islands; and on the west side by Red Cliff bank, by the reef which projects eastward from Pulo Oobin, and by Tanjong Kopo and the coast to the northward of it. Between the spit of Red Cliff bank, and the bank southward of Tikong Besar, the channel is about 1½ miles wide, with depths of 7 to 13 fathoms; farther in between Pulo Oobin bank and the shoal bank opposite to it, the breadth is but three-quarters of a mile, with depths of 7 to 15 or 16 fathoms, excepting abreast of Tikong Ketchil, where there are some patches of 5 fathoms.

The old town of Johore, once a place of considerable trade, now consists of some wretched huts built with bamboo and mud, where good water may be procured, but nothing else. It stands about 10 miles up the river, which is navigable for vessels the whole distance. It is not at all probable that European vessels will have to proceed to Johore for several years to come yet, although it is quite possible that the energy of the present Maharajah (the sovereign of Johore) may, in the course of time, again develop some trade there.

Such marks and directions as could be collected from the chart to assist a vessel in keeping clear of the banks which bound the Qualla Johore, have been given with the description of those dangers, and it is unnecessary to repeat them here. Horsburgh gives some few directions for this river, but they are not now to be relied upon, and are therefore omitted.

* *See* Admiralty plan of Sirangoon harbour and Johore channel, No. 1,734; scale, *m* = 2 inches.

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Should a vessel, therefore, have to proceed up the river, it would be necessary to obtain the assistance of a native pilot.

TIKONG BESAR, and Tikong Ketchil are the two islands lying north-westward of Tanjong Johore, at the entrance of the Johore river, dividing that stream into two branches. Tikong Besar, as its name implies, is the larger island of the two, being in extent $3\frac{1}{2}$ miles east and west, and $2\frac{1}{4}$ miles north and south. Tikong Ketchil, or little Tikong, lying close to the west side of the larger island, is in shape nearly round, its diameter being about two-thirds of a mile. There is a small islet named Pulo Sijonkan lying close to the south-east side of Tikong Besar; and another named Pulo Sijahat at three-quarters of a mile to the southward of Tikong Ketchil. A rock awash having 6 fathoms close to, lies on the edge of the bank, 2 cables north-westward of Pulo Sijahat.

Kapala Rocks appear to be three rocky heads awash, the outer one lying S. by E. $\frac{3}{4}$ E. rather more than $1\frac{1}{2}$ miles from the south point of Tikong Ketchil; $1\frac{1}{8}$ miles W. by S. $\frac{1}{2}$ S. from the south point of Tikong Besar; and 4 miles W. by N. $\frac{1}{2}$ N. from Tanjong Johore. From the outermost rock, the northern rock bears N.W. $\frac{1}{4}$ N. nearly a quarter of a mile, and the eastern rock N.E. by E. $\frac{1}{2}$ E. the same distance.

TIKONG BANK is the extensive shoal bank which surrounds both the Tikong islands, and also projects outside the islets and rocks just mentioned. Its edge is distant from Pulo Sijonkan, in the direction of Tanjong Johore, about $1\frac{1}{4}$ miles; it thence trends in a N.N.E. direction, passing about a quarter of a mile outside the east end of Tikong Besar. Southward of Pulo Sijonkan the bank extends farthest, its edge in this direction being distant nearly $1\frac{1}{2}$ miles from the islet. From this part the bank trends about W.N.W. passing just outside the Kapala rocks, and then curving in a north-westerly direction, projecting again westward of Pulo Sijahat, to the distance of a third of a mile. Thence it takes a northerly direction, and close to the south-west part of Tikong Ketchil, projects, outside some rocks, a third of a mile to the westward of the north-west part of that island, and in the form of a long spit $2\frac{1}{2}$ miles to the northward of it.

The eastern side of this bank is rather steep, and must be approached with caution; on the south side the depths decrease more regularly, and it may be approached with proper attention in that direction by the lead; but its western side is steep close to, from half a mile south-eastward of the Kapala rocks to its extreme northern point, and the lead will give no warning when nearing it.

The southern extreme of Tanjong Johore bearing East will lead to the southward of this bank; and to keep clear of that part of it near the

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Kapala rocks, Tanjong Changhi must not be brought to the westward of W. by N. ½ N. until the western extreme of Tikong Ketchil bears N. ½ W.

CALDER HARBOUR is the name given to the entrance of one branch of the Johore river. It lies just round Tanjong Johore, bounded on one side by the bank fronting the coast to the north-westward of Johore hill, and on the other, by the extensive bank which projects from Tikong Besar. The breadth of the harbour is three-quarters of a mile, with anchorage in 5½ to 9 fathoms.

TANJONG JOHORE, bearing E. by S. 5¾ miles from Tanjong Changhi, is a bluff promontory forming the eastern side of the entrance of Johore river, and of the Old strait of Singapore.

The edge of the shore bank extends a mile to the southward of Tanjong Johore; but in south-westerly and westerly directions from it, the bank does not project farther than a third of a mile.

Malang Berdaun is the name of a small group of rocks comprising one several feet above water, and others close to its east and west sides. The large rock lies about three quarters of a mile south-eastward of Tanjong Johore and W. by N. ¾ N. 2¾ miles from Tanjong Stapah, inside the edge of the bank, which extends off in some places more than a mile from the coast between those points. Southward of the rocks the edge of the shore bank is barely two cables distant, but south-westward of them it is twice as far, the bank there forming a tongue which extends two or three cables, in a southerly direction from Tanjong Johore, outside its general contour.

The soundings decrease suddenly from 7 to 4 fathoms towards the bank fronting the coast between the above-named points, which must be neared, under the distance of 1½ miles, with caution. Little Johore hill bearing N. ½ W. will lead west of the Malang Berdaun rocks, and South point, open of Tanjong Stapah, bearing east, will lead to the southward.

These dangers are, however, quite out of the ordinary track of vessels as they lie inside the Johore shoal.

TANJONG STAPAH, lying S.E. by E. ½ E. 3¼ miles from Tanjong Johore, is a somewhat prominent point, owing to the coast line westward of it receding sharply to the N.N.E. for a third of a mile, and then curving in a W.N.W. direction to Tanjong Johore. The 3-fathom edge of the shore bank is half a mile distant from Tanjong Stapah, which should not be approached within three-quarters of a mile, or under a depth of 7 fathoms.

Tanjong Teeram, bears E. ½ N. 1½ miles from Tanjong Stapah, the coast line between forming a small bay, in which are a few fishermen's huts and some fishing stakes extending off; rocks, awash and below water, lie off Tanjong Teeram, and there are also many between it

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and South point; but they are all within the margin of the 3-fathom edge of the shore bank, which extends along this coast fronting it to a distance of about three-quarters of a mile.

SOUTH POINT, or Tanjong Tehimpang, the most southern point of this part of the Malay peninsula, lies about 2½ miles E. ½ S. from Tanjong Teeram. The 3-fathom edge of the shore bank which fronts this part of the coast is distant about a third of a mile from South point; the soundings near it decrease rather suddenly from 10 or 9 fathoms.

South point is a good mark when kept in line with Tanjong Stapah, from which it bears E. ¼ S. 3¾ miles, to keep vessels well clear to the southward of all the dangers near the Romania islands.

Tanjong Romynia.—Songie Kalarang.—Tanjong Romynia lies E.N.E. 1¾ miles from South point. Close to the westward of Tanjong Romynia are two small points or heads, between which and South point is a small bay and the entrance of a small river, the Songie Kalarang. The 3-fathom edge of the shore bank is rather more than half a mile from this part of the coast.

The coast from Tanjong Romynia recedes to the north eastward for about 2¼ miles, thence to the south eastward for about 1½ miles to the south-west extreme of Romania point, thus forming a bay.

The depth of the bay is filled with mud and sand, and the 3-fathom edge of the shore bank, which fronts the whole south coast of the Malay peninsula is 1¼ miles from the shore of the bay, and three-quarters of a mile southward of the south-west part of Romania point, projecting further there than elsewhere.

Water Island, lying N.E. ½ E. about half a mile from Tanjong Romynia, is a round island, about a quarter of a mile in extent, with an islet off its south-west part, connected to it by a reef.

This island can be approached on its south side to three-quarters of a mile in depths of 5 or 4 fathoms, regular soundings, the 3-fathom edge of the bank being distant rather more than half a mile from it in a southerly direction.

Water.—On the east side of the bay between Tanjong Romynia and the south-west extreme of Romania point, and close to the latter is Diana cove, where there is a stream of fresh water. The Romynia river, situated at the head of the bay, has 2 or 3 feet water at its narrow entrance at low tide, and is navigable by boats 2 or 3 miles inland. Horsburgh remarks upon this river and other watering places as follows:—

"Although nothing is found here but timber, fish, and reptiles, water may be procured with ease in this river, during the north-east monsoon; but

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there are several better and more convenient watering-places in the sandy bays between Water island and Romania point. Inside Water island there is an excellent stream upon the main, where fresh water may be obtained with facility in either monsoon; but in the north-east monsoon the streams between it and Romania point are more convenient. In the eastern extreme of this bay there is a large rivulet, having shoal water projecting a considerable way out from the entrance, with rocks containing beds of excellent oysters."

ROMANIA POINT, or Tanjong Penyusoh, is the south-east extreme of the Malay peninsula; the point itself, like the circumjacent coast, is level land covered with trees, but behind it are some small hills. Coral reef fronts the point to the distance of a cable, but in a southerly direction it extends nearly 3 cables.

Between the south-west extreme of this point which is conspicuous, (although no name is given on the chart) and the south-east extreme at 1½ miles E.N.E. from it, two points project, forming three small bays.

East coast of the Malay Peninsula.—The coast from Romania point trends sharply to the northward, and at a distance of three-quarters of a mile is a point with some rocks off it, whence the land recedes forming a bay about a mile deep, the northern horn of which, named Tanjong Pungi, bears N. ¾ E. 4 miles from Romania point. Just to the southward of Tanjong Pungi is the small islet, Pulo Pungi, lying off the entrance of Pungi river. About 4½ miles N. by W. from Tanjong Pungi is Sitajam point, which bears about West from the northern edge of the north patch, the outermost of the shoal patches which extend from the Romania shoals.

A shoal bank fronts the whole of the coast from the point a mile northward of Romania point to Sitajam point. Abreast of Barbukit hill it projects 1½ miles from the shore, as far as the meridian of North rock, which bearing South leads close to its edge. Off Pungi point it extends about a third of a mile, and off Sitajam point three-quarters of a mile.

Except near that part of this bank extending from abreast of North rock to a mile nearly North of it, and which shoals suddenly under a depth of 9 or 8 fathoms, the bank may be approached by the lead with proper care, as the depths decrease pretty regularly from the depth of 10 to 6 fathoms.

The country abounds with various kinds of timber, wild elephants, buffaloes, moose-deer, hogs, guanas, monkeys, and peacocks; oysters will also be found upon the rocks; but this part of the Malay peninsula is not inhabited. Near Romania river there is a considerable extent of forest,

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which being without much underwood is easily penetrated; but in other parts the woods are generally impervious.

Water.—Excellent water can be procured from the river close round the rocky point, about 6 cables northward of Romania point.

ROMANIA ISLANDS is the somewhat incorrect but long accustomed designation of six mere islets or rocks which, together with many dangers around and amongst them, front Romania point; they extend nearly 2 miles in a N. by E. and S. by W. direction.*

Large Island, the westernmost and largest of the islands, is half a mile E.S.E. from Romania point; it is barely a cable in extent, but is conspicuous from being covered with trees. An islet, or rock, one third the size, lies about a cable north-eastward of it, both being situated towards the southern part of a reef which extends 3 cables northward of Large island, but a much less distance in other directions.

South Island lies 4 cables S.E. by E. ½ E. from Large island; it is very small, but covered with trees, and therefore easily discerned. There is a rock, about 12 feet above water, near the south point of South island, and a reef of straggling rocks extending to the eastward, which are bold to approach on the south side.

Peak Rock, a remarkable barren rock, easily recognised; it lies N.E. by E. half a mile from South island, and 6 cables eastward of Large island. A rock awash lies close to the north-eastward of it.

North Island, very small but covered with trees, lies N. ½ E. three quarters of a mile from South island, and N.W. by N. 6 cables from Peak rock; shoal water extends 3 cables to the northward of it.

North Rock, very small and barren, lies N. ¾ E. nearly a mile from North island.

DANGERS.—The following dangers lie in the vicinity of the Romania islands:—

A doubtful Shoal with 2¾ fathoms water over it, and which is the southernmost of the dangers near the Romania islands, lies with the large Romania island bearing N.N.E. easterly 1¼ miles; Horsburgh light-house E. ¼ S. 7½ miles; Romania point North 1⅓ miles; and South point W. ½ S. southerly nearly 5¼ miles. There is a patch of 4¾ fathoms lying a third of a mile in a south-easterly direction from this shoal.

* These islands and dangers have not been thoroughly examined. The survey of the neighbourhood was commenced in H.M.S. *Rifleman*, 1868, and after a few days had to be discontinued for more urgent work. Most of the descriptions here given are from the survey of Mr. Thomson, formerly Government Surveyor at Singapore, and from Horsburgh's Directory.

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Clearing Mark.—There is 9 to 12 or 14 fathoms close to the above dangers. Tanjong Stapah in line with South point bearing W. ¼ N., will lead clear to the southward of the last-mentioned patch of 4¾ fathoms, as also to the southward of all the dangers near the Romania islands.

A Rock awash lies with South island N.E. ¾ E., one third of a mile, and the large Romania island N. by W. about the same distance.

A Three-Fathom Patch lies S.E. by E. ½ E. nearly half a mile from the rock awash. From the centre of the patch South island bears N. by W. ¾ W. half a mile; the south end of the large Romania island N.W. three-quarters of a mile; and South point W. by S. 6¼ miles.

Stork Reef, lying N.E. by E. ½ E. half a mile from the three-fathom patch, is about 3 cables in extent N.E. and S.W., and from its south-west point Barbukit hill is in line with the north hump of the large Romania island bearing W. by N. ¾ N.; Peak rock N.W., a little more than half a mile; the south-west part of Romania point, West; and Horsburgh lighthouse E. by S. ¼ S. 6 miles.

Congaltons Carr, a rocky patch with 9 feet water over it, and 8 to 12 fathoms close to, is the easternmost of the dangers lying near the Romania islands. From it the middle of the largest island is in line with Peak rock, the latter distant a mile; North rock bears N.W. ¼ N. 1¾ miles; and Horsburgh lighthouse E.S.E. easterly 5½ miles.

To avoid this danger do not bring the southern extreme of the largest Romania island to the westward of W. ½ N., or the centre of that island in line with Peak rock, until Tanjong Pungi bears N.N.W. ½ W.

Caution.—When the tide is running to the westward, vessels passing through the North channel must be very careful that they are not set too near this danger, of which the lead will not give timely warning.

A rock awash lies a short distance E.N.E., and a 4-fathom patch about a quarter of a mile N.N.E. from Peak rock. Another 4-fathom patch, with 12 fathoms near it, lies a short distance to the northward of Whale rock.

Whale Rock, or Whales Crown Rock, lying nearly three-quarters of a mile N.E. ½ E. from Peak rock, is a small ledge of rocks which is particularly dangerous, as it is only at about three-quarters ebb that a small round rock becomes visible and indicates the existence of the danger. It is steep-to, and the depths in its vicinity are irregular, varying from 15 to 8 or 9 fathoms. From it North rock bears N.W. ¾ N., over a mile.

Jones Reef, having 6 feet on it and 8 or 9 fathoms close to, lies N.N.W. ¾ W. a little over half a mile from Congaltons Carr, with

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Peak rock bearing S.W. ½ W. one mile, and North rock N.W. ½ W. 1¼ miles.

A Reef, about half a mile in extent and dry in places, lies between North island and North rock. Its eastern extreme is North from Peak rock nearly a mile; and its western extreme rather less than half a mile S.S.W. from North rock. Upon the western part is a rock dry at half tide, on the opposite side a rock above water; and there is a 4-fathom patch between it and North island.

Caution.—As no advantage is to be gained by venturing amongst the islets and dangers, just described, it is best to consider the whole of the space occupied by them as impracticable for ordinary navigation, and carefully avoid the locality.

PEDRA BRANCA, or White rock, lying in the middle of the eastern entrance of Singapore strait, is 150 feet long, 100 feet broad, and 24 feet above the level of high water spring tides. Its position will be readily known by the lighthouse, 93 feet high from base to vane, which was erected on it in 1851, and named after the celebrated hydrographer, Horsburgh, whose labours have in a high degree benefited the interests of navigation and commerce in every part of the eastern seas. The light-house is a pillar of granite, and the lantern is covered by a spherical dome, painted white. The largest island off Romania point bears from it W. by N. ⅛ N. 7¼ miles; it is 8 miles distant from the shore of Bintang, and is in one with the centre of Bintang Great hill, bearing S. by E. ⅛ E.

HORSBURGH LIGHT.—The lighthouse on Pedra Branca exhibits, at an elevation of 95 feet above high water, a *revolving white* light, which attains its brightest period *once every minute;* its greatest brilliancy is of *fifteen seconds* duration, when it gradually declines until it totally disappears to a distant observer; but within a short distance of the lighthouse it is never entirely invisible. The light should be seen in clear weather from a distance of about 15 miles.

DANGERS near PEDRA BRANCA.—With the exception of a patch of 4 fathoms, the north and north-west sides of Pedra Branca are steep-to, there being 17 fathoms close to the rock, and 27 to 35 fathoms near it.

This 4-fathoms patch lies about a quarter of a mile northward of the rock, and is the only shoal spot between it and the Romania shoals in which space the depths are very variable in mid-channel, 17 to 33 fathoms, but they become more regular, 17 to 14 fathoms, towards the Romania shoals.

The east, south, and south-east sides of Pedra Branca should not be approached nearer than a mile, for there are dangerous rocky patches to

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the distance of half a mile from the east side; and the south and south-east sides are foul to three-quarters of a mile.

MIDDLE ROCKS are two dangerous ledges, a little above the surface at high water, lying South and S.S.E. ¼ E. from the lighthouse. Eastward a short distance from the Middle rocks is a patch of 4 fathoms, and North a quarter of a mile from this patch is a rock with only 3 feet of water over it.

SOUTH LEDGE, called by Horsburgh the South-west rocks, consists of three dangerous, pointed rocks, very little detached from each other, with 8 and 9 fathoms close to, and 16 or 18 fathoms at a short distance to the eastward. They are of small extent, not visible until the ebb has made some time, and are nearly covered before the stream of flood begins to run. Horsburgh lighthouse bears from them N. by E. ⅔ E., distant 2 miles; the large Romania island N.W. by W. ⅛ W. 7½ miles; and the outer hill on Brakit point E.S.E. 12½ miles.

The ROMANIA SHOALS are a number of detached patches of sand and coral—various as to extent and depth of water—stretching in a north-easterly direction from the rocks and dangers which lie outside the Romania islands, towards the North patch. Between these patches are channels with depths of 8 to 10 fathoms water.

The limits of these shoals, to depths of 4 fathoms and under, lie between the bearings of N. by W. ¼ W. and N.W. ½ W. from Horsburgh lighthouse, the distance on the former bearing being 6, and on the latter 5 miles. The least water shown upon the Admiralty chart is 2¾ fathoms,* and this shoal portion lies between the bearings N. by W. ¾ W. and N.N.W. ¼ W. from Horsburgh lighthouse, and is nearly half a mile in length, in a northerly direction.

"The patch of the outer reef nearest to Pedra Branca bears N.N.W. ¼ W. 4¼ miles from it, and is steep-to and dangerous, having on it 18 feet rocks. On this patch the *Anna* struck in December 1800. With the wind north-westerly, rounding the edge of the reef very close in soundings from 12 to 9, and once 7 fathoms, a strong ebb tide running to the northward set us among the eddies upon the reef, and we had several casts of 7 fathoms. The outer edge of it, where the ship touched the rocks in hauling off the reef although drawing only 19 feet water, formed a steep wall, which was very conspicuous by the deep-blue water outside and the white discoloured water within. She took a considerable careen by the fresh wind and strong tide, and grazed over the rocks into 12 fathoms the first cast, Pedra Branca bearing then S.S.E. ¾ E. about 4¾ miles, South island off Romania

* The least depth shown on the old Admiralty charts was 3½ fathoms, but 2¾ fathoms was obtained by Navigating Lieutenant Ray, of H.M.S. *Rifleman*.

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point S.W. by W. ¾ W., south point of the largest island W. by S. ¼ S., and its southernmost hump in one with the south cape or westernmost point of Romania. A few cables to the southward of this dangerous patch the depths increase to 16 and 17 fathoms, and it is thought to be the south-westernmost danger of the outer reef."*

Outside the north-east limit of the shoal part of these reefs the patches have depths generally of 6 to 8 or 9 fathoms over them, but there is one patch of 5 fathoms bearing N. ½ W., and another of the same depth bearing N.W. by W. from the lighthouse.

South island, the southernmost island of the Romania group, just open of South point (the southern extreme of the Malay peninsula), bearing W. by S. ½ S. leads to the southward of the Romania shoals; and Horsburgh lighthouse kept to the southward of S. by E. ¼ E., or in line with the west apex of Bintang Great hill, will lead to the eastward of those patches, which have less than 5 fathoms over them.

NORTH PATCH, lying N.E. by N. 7 miles from the shoalest part of the Romania shoals, is generally considered the outermost of the Romania shoals, for the reason that the Eastern bank, which lies 4¼ miles E. by N. from North patch, not having less than 7 or 8 fathoms water over it, is not only not dangerous to the mariner, but is, in fact, useful to him, serving to determine his position; whereas the North patch, having depths only of 3¾ and 4 fathoms, is not safe for a large vessel to cross in a swell or heavy sea. The patch is nearly a mile long, north and south, one-third of a mile broad, and composed of mud and sand. From the north end of the North patch, False Barbukit hill bears W. ½ S. 12¼ miles; Barbukit hill S.W. by W. ¾ W. 16 miles; and Horsburgh lighthouse S. by W. 11¼ miles.

North patch lies near the north end of a narrow strip of bank which extends from the Romania shoals; the general depths over it are 6 to 10 fathoms, but about three-quarters of a mile southward of North patch there is a depth of 3¾ fathoms, and 1½ miles farther south 5 fathoms; there are also two other 5-fathom spots 1¾ miles north-eastward of the Romania shoals.

Bintang Little hill, open to the westward of Bintang Great hill, leads half a mile eastward of the North patch, and also of the 3¾ and 5 fathom spots southward of it.

THE EASTERN BANK, the outermost of the shoal patches off Roumania point, is nearly 1½ miles in extent, with depths of 7 to 10 fathoms, and 11 to 14 fathoms close around. It lies about a mile inside the range of the Horsburgh light, and from its outer edge the light bears

* Horsburgh.

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S.W. by S. 14 miles, False Barbukit W. ½ S. 17 miles, and Barbukit hill W. by S. ¾ S. southerly 21½ miles.

Navigators getting soundings of 8 to 10 fathoms on this bank, during hazy weather, sometimes think they are on the northern patch of Romania outer reef, and then haul more to the eastward, which renders them liable to fall to leeward of the strait.

Soundings.—From 1½ to 2 miles south-eastward of St. John islands, where the depths are 85 and 86 fathoms, the general soundings in mid strait to abreast of Romania point are 18 to 27 and 30 fathoms, with occasional casts of 12 and 14 fathoms; towards the northern shore the depths decrease gradually to 8 and 6 fathoms, but towards the southern the soundings are irregular and deeper, there being 27 to 30 fathoms within a mile of Pulo Battam; the only dangers to be avoided are the Johore shoal on the north side of the strait, and the Pan reefs and Crocodile shoal, within the entrance of Rhio strait, but the latter are out of the direct tract of vessels working through Singapore strait.

About 5 miles W. by S. and W. by S. ½ S. from Pedra Branca, there are some small banks with 10 to 17 fathoms water on them and 20 to 30 around, and about one mile, between the bearings of W. by N. ½ N., and W. by S. ½ S. from Pedra Branca, there are 34 to 36 fathoms.

In the South channel between Tanjong Brakit and Pedra Branca, the depths are too irregular to be relied upon to guide a vessel safely. The 10-fathom edge of the shore bank extends from a short distance outside Langui shoal in a N.E. by E. direction, passing about a mile outside Diana shoal, thence with an irregular outline it extends half-way across the channel between the western part of Tanjong Brakit and Pedra Branca. There is, however, inside the edge of the bank, a space, the inner part of which is about half a mile outside the 1½-fathoms shoal off the western part of Brakit point, where the depths are 11 and 12 fathoms; and to the westward of these deeper soundings, and extending E.N.E. about 1½ miles from the Diana shoal, is a bank with but 6 and 7 fathoms over it: to the southward of this bank are 9 and 10 fathoms, decreasing to 7 and 6 fathoms close to the Bintang shore. In the fair channel are 12 to 14 fathoms, and 16 to 20 fathoms towards the dangers near Pedra Branca. The depths in this channel are much greater to the westward of the meridian of Pedra Branca than upon or to the eastward of its meridian, which ought to be kept in remembrance when passing through in the night.

In the Middle channel, between Horsburgh lighthouse and Romania shoals, the depths are very irregular, 17 to 35 fathoms close to the light-house, 19 to 30 fathoms in mid-channel, with some soundings of 14 and 15 fathoms rather nearer the shoals, close to which are 17 to 14 fathoms. In a line between the lighthouse and the Stork and other reefs off Romania point, there are 30 to 35 fathoms near the lighthouse, 19 to 21 fathoms in

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mid-channel, decreasing to 16 fathoms towards the reefs, close to which are 11 or 12 fathoms.

Approaching the eastern entrance of Singapore strait from the southward, when from 5 to 10 miles eastward of Pulo Rúig or Pulo Panjang (pages 337 and 338), the depths will be generally 22 or 24 fathoms, with an occasional cast of 17 or 18, or perhaps 25 or 26 fathoms. Between Pulo Panjang and Tanjong Brakit, the south-eastern extreme of the strait, the depths are 20 and 21 fathoms at the distance of 20 miles from the Bintang coast, decreasing to 17 or 18 fathoms at 10 miles from it, and shoaling thence gradually towards the shore. Ten miles north-eastward of Tanjong Brakit are 20 or 19 fathoms, decreasing towards Brakit rock to 14 and 13 fathoms, which depths will be found close outside that danger. A narrow bank of coral and sand, with 7 to 10 fathoms over it, lies 4 or 5 miles off Tanjong Brakit, between the bearings of N.E. and N.W. by N.; outside this bank are 14 and 13 fathoms, and 11 to 14 fathoms inside, with several patches of 9 and 10 fathoms. Towards Tanjong Brakit and the Postillion reef, the depths decrease with tolerable regularity, but vessels should not come under 10 fathoms.

Approaching the strait from the eastward 30 to 26 fathoms will be had at a distance of 40 miles from its entrance; 26 or 24 fathoms at 30 miles; and 22 to 20 fathoms at 20 miles, decreasing to 14 or 13 fathoms at 15 or 13 miles from Horsburgh lighthouse. At 10 miles eastward of the lighthouse the soundings become irregular, 9 to 14 fathoms, and continue to be so to within 4 miles of the lighthouse, when they deepen to 16 or 17 and soon to 18 or 19 fathoms; close to the dangers near the lighthouse they are irregular, 9 to 14 fathoms.

Approaching the strait from the north-eastward, about 30 fathoms will be obtained at a distance of 40 miles; 25 or 23 fathoms at 30 miles, decreasing to 16, 15, or 14 fathoms, at 16 or 17 miles, and then again deepening, regularly, to 18, 20, 24, 27, and 29 or 30 fathoms towards Horsburgh lighthouse, close to which are irregular soundings of 18 to 35 fathoms. A mile or two eastward of the Eastern bank the depths are 14 or 15 fathoms, and 16 to 18 fathoms from one to 4 miles eastward of the North patch. A mile or two from the Romania shoals the depths are 18 or 20 fathoms, shoaling to 16 or 14 fathoms near them.

The TIDES* near Pedra Branca, and contiguous to the Romania reefs, are frequently very irregular in time, velocity, and direction. In the strength of the north-east monsoon, when the current runs to the S.S.E. from Pulo Aor across the equator, the flood sometimes runs into the entrance of the strait to the south-west 10 or 12 hours at a time; but the ebb generally runs with the greatest velocity, and of longest duration, in both seasons,

* Horsburgh.

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particularly in the south-west monsoon. About full and change the ebb often sets out strong during the night, for 10 or 12 hours together, but not very rapidly in the first and latter part; at other times it is changeable, and not strong. Between Pedra Branca and the edge of Romania reef the strength of the ebb runs generally about N.E. by N., when regular, and the flood in the opposite direction; but the tide has been sometimes observed to set all round the compass during the night, and once N.N.W. 2 miles an hour directly over the reef. About the northern patches of the reef the tides have also been found at times very irregular, setting East and West, and all round the compass; but their general direction in that part is nearly North and South, or within two points of the meridian. In the South channel, between Pedra Branca and Bintang, the flood sets about W.S.W. and W. by S., and the ebb in the opposite direction along the Bintang shore, but subject to irregularities.

It is high water, full and change, at Pedra Branca about 11 h., when any regularity is preserved by the tides. The velocity of the ebb, when strongest, is from 4 to 4½ miles an hour in the entrance of the strait and between Romania point and Pedra Branca; but the flood is not so strong. The strength of the tides during the neaps is from 2 to 3 miles an hour, frequently very irregular.

In making Singapore strait, vessels should always be prepared to meet with a current running to the southward in the north-east monsoon, and to the northward in the opposite season, the strength of which is governed by the strength of the monsoon. In fine weather its rate is usually from 1½ to 2 knots an hour, but the rapidity of the current is also accelerated or retarded by the local tides near the coast.

The following observations on the tides in Singapore strait were made in the German corvette *Nymphe*, 29th April 1873, namely:—A flood tide of 15 hours' duration, at the rate of 1½ knots an hour; which to the northward of Pedra Branca set, first South, then S.W., and finally West. The ebb tide ran for 9 hours in the opposite directions, at the rate of $2\frac{7}{10}$ knots an hour.

The flood sets in on the southern side of the strait, while in the northern part the ebb is running out strong.

DIRECTIONS.—Singapore Roads to the Eastward.—On leaving the roads steer about E. by S. until past Tanjong Catong, when a course may be shaped about East, and by not bringing the flag-staff on fort Canning to the southward of West as long as it remains in sight, it will lead well clear of Johore shore. When Johore hill bears North, the vessel will be eastward of Johore shoal, and may steer E. by N. for the lighthouse, and passing about a mile to the northward of it, proceed to sea as convenient.

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To work through the Eastern Part of the Strait.—No difficulty will be experienced by strangers in working in either direction through the eastern part of the strait. The most prudent plan is to keep towards the north shore, in case of having to anchor, as the depths are more convenient on that side of the strait. From Singapore roads to Johore shoal the shore may be approached to 12 or 11 fathoms; but it is not prudent to go into a less depth. Romania South island kept open of South point leads to the southward of Johore shoal, and when standing towards this danger, if these objects cannot be seen, avoid coming under 17 or 16 fathoms, and on no account under 12 or 11 fathoms, for the shoal is steep.

Between Johore shoal, and the west extreme of Romania point, the shore may be approached to a depth of 12 or 11 fathoms; from thence Tanjong Stapah must not be shut in behind South point when standing to the northward, until South island bears to the westward of North; and when standing towards Stork reef and Congaltons Carr, South point should not be brought to the southward of W. ½ S. A vessel should tack towards the Romania shoals, when South island is seen opening to the southward of South point.

There are no dangers on the south side of the strait, excepting those fronting the Bintang coast and the Crocodile and Pan shoals, &c. But a vessel should not stand so far over as to get near these dangers, for no advantage will be gained by doing so, and the depths there are inconveniently great for anchoring. Pulo Nongsa, a remarkable little island, with a high tree upon it, lying just to the westward of the entrance to Rhio strait, is very convenient for taking bearings of when getting over to the southward near Rhio strait, and if kept to the southward of West, will lead clear of all danger at the entrance of that strait.

THE SOUTH CHANNEL is sometimes convenient for ships which fall to leeward of Horsburgh lighthouse during thick weather, as they have no occasion to anchor outside. If the wind be north-easterly, they may run down until within 4 or 5 miles from the Bintang shore, remembering that Barbukit hill must be kept four times its own breadth open northward of Horsburgh lighthouse, or the lighthouse kept westward of W. by N. ½ N. to clear the Brakit rock, then haul to the westward, and pass nearly in mid-channel between the shore and the lighthouse in 11 to 13 fathoms of water. With the wind at N.W. or North, it will be advisable to borrow nearer to the South ledge than to the Bintang shore, observing not to approach too closely to the South ledge, as it is covered at half-tide. By borrowing towards the weather side of the channel, vessels will be enabled to reach well into the entrance of the strait; and if the wind be scant and the tide against them, they will have smooth water and good

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bottom for anchorage, until the tide is favourable for proceeding to the westward.*

A detailed description of the dangers and bearings to clear them have been given at pages 123 to 125, to which the navigator is referred in case he determines to use this channel, which it would not be advisable to do unless under the circumstances of finding his vessel too far to leeward to fetch into the strait to the northward of Horsburgh light. Neither does there seem to be any advantage in using this channel when leaving the strait; it is much better to keep to the northward in the north-east monsoon, as close as possible to the Romania islands, and stand out through the Middle channel.

THE MIDDLE CHANNEL between Horsburgh lighthouse and the Romania shoals is the main entrance to Singapore strait from the eastward. Although the South channel is still recommended in Horsburgh as being preferable for sailing through in the night, yet it is so incumbered with dangers, to clear which no good marks can be given, that it is seldom used by those accustomed to the navigation of the strait, more especially since the discovery, in 1861, of the Brakit rock off Brakit point, which is extremely dangerous to vessels standing out in the north-east monsoon. The difficulty and danger attending the navigation of this channel arises from the risk of wrongly judging the distance from the lighthouse when endeavouring to keep clear of the South ledge. In making sure of being to the southward of this ledge, vessels have frequently got too far over on the Bintang coast, and been lost upon some of the dangers there; others have also been lost upon some of the dangers near Brakit point, in endeavouring to get out of the strait by this channel in the north-east monsoon.

Coming from the eastward or north-eastward in the daytime, the entrance of Singapore strait may be easily recognized if the weather be fine and clear by Bintang Great hill, a remarkable Saddle hill (1,250 feet high) on Bintang island, and the sharp-peaked hill of Barbukit (645 feet high), on the opposite side of the strait. Bearings of these objects will serve to determine the vessel's position and guide her in shaping a course to sight the lighthouse. In making the entrance at night, if the vessel's position be known, it will be merely necessary to stand on boldly for the light, being careful to make a proper allowance for the set of the current, and when the light is seen, steer so as to pass about a mile to the northward of it. Vessels should not get within about 2 miles of the light until it bears to the southward of W.S.W., on account of the dangers lying off its east side. (*See* also foot note, p. 144.)

It is from the northward, however, that the strait is mostly made (viz., by vessels coming from China), it being now the general custom for

* Horsburgh.

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vessels from the southward to enter from Rhio strait. Horsburgh gives the following directions for ships to proceed from Pulo Aor to the entrance of the strait :—

During the strength of the north-east monsoon the current sets generally to the southward or S.S.E., between Pulo Aor and the east end of Bintang, by which vessels running for Singapore strait in thick weather, are liable to fall to the southward of its entrance, if proper allowance be not made.

Departing from Pulo Aor, steer to bring it to bear about north when disappearing : if the weather be clear, Bintang hill and Pulo Aor may be seen together ; but this seldom happens. Do not bring the centre of Bintang Saddle hill to the eastward of South, until Horsburgh lighthouse is visible from the deck ; for with the hill bearing South the vessel will not pass far outside the North patch ; but it is a safe bearing if the compass be correct, and will lead down in soundings of 16 to 13 fathoms. Bintang Little hill, open to the westward of Bintang Great hill, leads to the eastward of the North patch.

In hazy weather Bintang hill is seldom visible until the Eastern bank is passed, in which case, having Pulo Aor disappearing about North, a course S. by W. to S.S.W. may be requisite to counteract the south-easterly current, or the ebb tide setting out of the strait to the north-eastward. The depths will decrease regularly in steering southward, and the low land will probably be seen to the westward, when in 20 or 18 fathoms ; if so, coast it along at 10 or 12 miles' distance, until False Barbukit low sloping hill is discerned, appearing a little way from the sea like a clump of trees more elevated than the others. When this hill bears W.S.W., 15 fathoms is the fair track ; with it bearing W. $\frac{3}{4}$ S. and W. $\frac{1}{2}$ S., overfalls in 16 to 13 fathoms may be experienced, or probably less water, being then about the parallel of the North patch and the shoal patch, with 8 to 10 fathoms, on the Eastern bank.

Having coasted along at 10 or 12 miles distance, with the land distinctly in sight from the deck, and having brought False Barbukit hill to bear about W. by S., the vessel will be approaching the North patch ; and with this hill bearing about W. $\frac{3}{4}$ S., if a cast of 10, 9, or 8 fathoms be got, but uncertain whether these soundings are on the North patch, or on the shoal patch of the Eastern bank, haul to the south-eastward until in 14 or 15 fathoms. Steer then South about 2 miles, or until False Barbukit hill bears West, when the vessel will be to the southward of the shoal patch of the Eastern bank, and abreast the North patch ; she may then haul in to the W.S.W., and get a cast of 10 or 11 fathoms, and will then be certain that these soundings are on the outer edge of the Romania shoals, but in doing so, heave the lead quickly, and if there be less than 10 fathoms, haul

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out directly eastward into 15 or 16 fathoms, and then steer along the south-east edge of the shoals in 16 or 17 fathoms. If when the lighthouse should be discerned, it bears S.S.W., the vessel will be clear to the eastward of the shoals; but if it be seen bearing S. by W., she will be close to or upon their edge. Having steered round the shoals so far as to bring the lighthouse S. by W., do not come under 16 or 17 fathoms in passing along their southern part; for they are there steep from 16 to 12, and from 12 to 3 fathoms at a cast, on some of the rocky patches, with the lighthouse bearing from S.E. ½ S. to South. South island just open to the southward of South point, bearing about W. by S. ½ S., leads clear to the southward of all the Romania shoals.

Although Pedra Branca rock is steep-to on the north side, it should not be approached very closely, for vessels are liable to estimate their distance from it sometimes greater than the truth; and as the tide runs strong, they are in danger of being drifted quickly towards the rock without warning, if they borrow near it in light winds.*

Having passed between the Romania shoals and the lighthouse, and bound to Singapore roads, if the vessel be over on the north side of the channel, steer about S.W. or S.W. by W., if in mid-channel about W.S.W., and if near the lighthouse about W. by S., taking care if on the north side of the channel to have Tanjong Stapah open of South point, before South island, of the Romania group, is brought to the eastward of N. by E. Having brought the lighthouse to bear E. by N., the opposite course (W. by S.) will lead at a convenient distance from the north shore of the strait until Changhi point bears North, when steer half a point more to the southward; the vessels in the roads will be by this time in sight, and be a guide in approaching the anchorage, and as Tanjong Catong is neared, the flagstaff on Fort Canning hill overlooking the town should not be brought to the westward of W. by N.

If the tide be running to the westward it is the usual practice for vessels to keep well over on the north side of the channel, especially in light winds, for neglecting this precaution they have often been swept by the rapid current past Singapore roads and the St. John islands—the deep water, 45 or 50 fathoms, rendering it difficult or impossible for them to anchor—into the western part of the strait. In doing this, however, they must be cautious not to get too near the Johore shoal, which will be

* This remark of Horsburgh's should be carefully attended to; for several vessels have been very nearly set on this rock in light winds, and Horsburgh gives the following account of a vessel which was thus drifted upon it and lost:—"The *Shah Munchah*, a large and valuable ship from China, bound to Bombay, standing into the strait at mid-day, with a strong flood tide and scant wind, stood too near Pedra Branca before tacking, and was totally lost, by the tide setting her upon the rock whilst in stays."—J. W. Reed, Master, R.N.

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avoided by keeping South Romania island open of South point, or South point to the northward of E. by N. ½ N.

At Night keep a good look-out for Horsburgh light, (page 135,) which, being visible in clear weather at 15 miles, will be in sight before the vessel can get too near the dangers at the entrance of the strait.

If entering the strait from the southward or south-eastward, the light is seen bearing to the southward of West, a course may be shaped to pass about 2 miles to the northward of the light, proper care being observed to allow for the set of the tide, so that the light is not neared under 2 miles, on a West or N.W. bearing, to avoid the dangers extending to the east and south-east from it. Should the light when first seen bear about W. by N. or W.N.W., a vessel will be within 2 or 3 miles of the Brakit rock, over which there are but 2 fathoms water, and from which the light bears W. by N. ½ N. 12¼ miles.

If when entering from the northward the light is made bearing anything to the southward of S.S.W., haul to the eastward until it bears S.S.W. which will lead outside the North patch; approach the light upon this bearing until about 2 miles from it, when a W.S.W. course may be shaped until the light is brought E. by N., when keep it on that bearing, steering W. by S. until the light is lost sight of.

Continuing for 4 or 5 miles farther on a W. by S. course after Horsburgh light has disappeared, the fixed light at Singapore will soon come in sight, but in case it should not be distinctly made out by the time Johore hill bears N. by E., do not come under 16 or 17 fathoms towards Johore shoal, and if a cast of 12 or 11 fathoms should be had haul quickly to the southward, for this shoal is steep, and should not be approached under that depth. Be careful not to mistake the light on Fort Canning hill, which will be seen some distance above the horizon when first discerned, and high above the lights of the shipping and town as the roads are neared; when plainly seen it may be approached on a West bearing until the eastern extreme of Singapore island (Changhi point) bears North, or Johore hill bears N.E. ½ E., when the light should be brought to bear W. ½ N.; as Tanjong Catong is approached, edge to the southward until the light is to the northward of W. by N.

It is very necessary to observe the precaution of keeping on the north shore of the strait when nearing Singapore roads at night, for although a vessel may have entered the strait with a strong north-east monsoon, yet as she nears the roads, the wind will, in the night, generally draw off the land from the north-westward, making it always very difficult and sometimes impossible to fetch into the roads or get into a convenient depth of water for anchoring.

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If bound into the strait of Malacca, a W. by S. ¼ S. course is the fair mid-channel track from Horsburgh lighthouse, and when within 5 miles of St. John island, the Raffles *fixed* white light on Coney island will be distinctly seen. A vessel should steer to pass within a short distance of St. John island, avoiding the south side of the strait, and proceed through the western part of the strait according to the directions give at page 101; the Raffles light bearing W.S.W. is the fair channel mark.

THE NORTH CHANNEL (the Great Inner channel of Horsburgh) is bounded on the east by the shoalest part of the Romania shoals, and on the west by the dangers which lie to the eastward of the Romania islands. The channel is about 3½ miles wide; there is one patch of 4 to 5 fathoms and another of 5 fathoms lying in its fairway, but there does not appear to be any less water, and it is now frequently used by those locally acquainted.

From the Southward.—In proceeding through the North channel from Singapore, take care, after passing South point, not to lose sight of Stapah point behind it, in order to avoid the 2¾-fathoms patch and other dangers near the Romania islands. When the largest of those islands bears N.N.W., steer N.E., to pass about three-quarters of a mile outside Congaltons Carr; but if the tide be setting to the westward, a more easterly course must be steered to avoid that danger, which will be done if the south end of the largest of the Romania islands be not brought westward of W. ¼ N., or Peak rock in line with the centre of that island, until the right extreme of Tanjong Punji bears N.N.W. ½ W. With these marks on the vessel will be in about 13 or 15 fathoms water, and may steer N. ¾ E., through the North channel in the middle track.

In following this middle track, the soundings will vary from 12 to 15 fathoms for the distance of the first mile, when they will suddenly decrease to 9 or 8 fathoms, and shortly after to 5 or 4½, and if at low water spring tides, perhaps to 4 fathoms. Having crossed this shoal part of the bank—which is only about a third of a mile broad—the soundings will soon deepen to 6, 7, and 8 fathoms, and by the time Barbukit hill bears W. ½ S., to 10 and 11 fathoms; thence to the northward they will continue to be 12 or 13 fathoms until past the North patch.

A vessel will avoid the 4-fathoms patch and cross the banks in not less than 6 fathoms water, by keeping Horsburgh lighthouse S.E. ¼ S. to S.E. ½ S., and steering the opposite course till the banks are crossed.

From the Northward.—Coming from the northward, and wishing to proceed into Singapore strait by the North channel, pass about midway between the North patch and the shore, and by the time False Barbukit hill bears West, Barbukit hill should bear S.W. by W.; nearly, or in case Barbukit cannot be discerned, the south extreme of

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Tanjong Punji should bear about S.W. ¼ W.; a S. ¾ W. course will then lead through the channel by the middle track, which passes over the patch of 4 to 5 fathoms.

A vessel following this track will have soundings from 13 to 10 fathoms, until Barbukit hill bears about W. by S. or W. ½ S., when they will decrease to 8 and 7 fathoms, and when Barbukit hill bears West to about 6 fathoms. She will then soon have 5 or 4½ fathoms on the bank, except at low water spring tides, when there may be as little as 4 fathoms. The depths will soon increase to 8, 9, or 10 fathoms, and then suddenly to 13, or perhaps 15 fathoms, when she will be in Singapore strait. This 4-fathoms patch may be avoided and the banks crossed in not less than 6 fathoms water, by steering for Horsburgh lighthouse bearing S.E. ¼ S. to S.E. ½ S.

Having crossed the banks, the S. ¾ W. course should be continued to avoid getting too near Congaltons Carr, over which there are but 9 feet. The middle of the largest of the Romania islands in line with Peak rock is the mark for this dangerous patch, and vessels should be cautious—extremely so when the tide is making to the westward—not to bring the east extreme of Tanjong Punji to the north of N.N.W. ½ W., until Peak rock is north of the middle part of the largest of the Romania islands, or until the south end of the last-named island bears W. ½ N. The vessel will then be to the southward of Congaltons Carr, and may steer S.W., but not more westerly, until Tanjong Stapah comes open south of South point, when she will be to the southward of all the dangers near the Romania islands, and may steer W.S.W. or W. by S., according to circumstances.

In Working through the southern part of this channel, Horsburgh lighthouse should not be brought to the southward of S.E. ¾ S. when standing towards the Romania shoals; nor to the eastward of S.E. by E. ½ E. when standing towards Congaltons Carr or Jones reef. The soundings are not at all to be depended upon to guide a vessel near these latter dangers for there are 12 fathoms in one direction and 6 in another very close to Congaltons Carr, and 9 or 8 fathoms close to Jones reef.

The INNER CHANNEL, between Romania point and the islands, cannot be considered safe, and we refrain from giving any directions which might have the effect of tempting vessels to use it. Directions are given in Horsburgh for its navigation, but it contains several dangers and is therefore not recommended. The *Sir James Brooke* steam vessel, which had frequently passed through it, at length struck upon a rock, and received so much damage that she had to be run upon the adjacent beach, where she became a wreck. The *Arratoon Apcar* steam vessel also struck

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upon a rock in the fairway of the channel, having 1¾ fathoms over it, and 3 fathoms around it.

Before this channel can be considered safe, it must be more closely surveyed, and a chart of it published on a tolerably large scale; but it is, in fact, of no great importance, as vessels can proceed more easily and safely by the North channel.

OLD STRAIT OF SINGAPORE OR SALAT TAMBROH.

This strait not being now used in proceeding to or from China, the approaches only have been mentioned in describing the northern shores of Singapore strait; the following brief description will however be necessary, as vessels trading to ports in the Old strait enter and leave by the eastern or Johore channel.*

Old Strait of Singapore, the channel between the northern shores of Singapore island and the Malay peninsula, was formerly the passage by which all vessels proceeded between India and China, when the strait at present in use was not known to be navigable. Its western entrance has very much filled up, even since Horsburgh's time; he gives 3½ fathoms as the least water, but the Admiralty chart now shows a bar of sand, with but 2 fathoms water on it, stretching across from Tanjong Gul to Tanjong Bolus.

No vessels now proceed through this strait, but they occasionally enter by the eastern or Johore channel to load granite at Pulo Oobin, or to load timber at a small town, about half way through the strait, close to Tanjong Putri in Johore, and which the present Maharajah is striving to bring into importance, having erected some extensive saw mills there, for the purpose of cutting up the timber as it is brought from the adjacent forests. But these vessels invariably enter and leave by the eastern channel, and it is not at all probable that the western part of the strait, which is extremely narrow and difficult to navigate, will ever again come into use, excepting, perhaps, for light draft steam vessels.

The eastern entrance of the Old strait is between Tanjong Changhi, and Tanjong Kopo on the Malay peninsula, and is divided into two channels by Pulo Oobin. The coast inside Tanjong Changhi, trends to the westward for about 1½ miles, when it recedes forming a bay, 3 miles wide, named Sirangoon harbour. About a mile inside Tanjong Changhi is a small river, with a few bungalows and a police station near it.

Several small rivers discharge themselves into Sirangoon Harbour, the principal of which, the Sirangoon, is at its western extremity. About

*See Admiralty plan of Sirangoon harbour, and Johore channel, No. 1,734; scale, *m* = 2 inches.

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1½ cables westward of the east point of the harbour, are two white rocks, named Batu Putih, with 13 fathoms close to them. The soundings in the harbour are from 7 to 14 fathoms, decreasing rather suddenly under 6 fathoms, so that caution is necessary when approaching the shore.

Sirangoon island lies about a mile to the northward of the entrance of Sirangoon river, but the mud-bank which fronts all this part of the coast of Singapore extends outside this island, leaving the channel between it and the west end of Pulo Oobin barely half a mile broad.

Pulo Oobin or Ubin, is about 4 miles long, W. by N. and E. by S., and a mile broad. A shoal bank extends from its east end, three-quarters of a mile in an easterly, and a mile in a south-easterly direction, close to which are 8 or 9 fathoms. Nearly half a mile S.S.W. from its east end is a dangerous rock, named Papan, inside of which is the small islet Pulo Sikodo having a reef extending 2 cables westward of it. A 3-fathoms patch also lies about 2 cables off shore, southward of the saw mills and quarries, with 6 fathoms between it and the shore. Westward of the south point of Pulo Oobin is a small island, named Pulo Kitam, off the north-west extreme of which some patches of reef extend half a mile in a north-west direction.

The entrance of the Old strait between the shoal extending south-eastward from Pulo Oobin and Tanjong Changhi is half a mile wide, with depths of 13 or 14 fathoms in mid-channel, decreasing to 11 and 9 towards either shore. The breadth is nearly the same between Papan rock and the opposite coast, as also between the 3-fathoms patch and Batu Putih; but between the south point of Oobin and the head of Sirangoon harbour, the distance is a mile, narrowing again between the north-west end of Pulo Kitam and the shoal bank, to three-quarters of a mile. Between Batu Putih and Pulo Oobin, the depths are 18 fathoms in mid-channel, but shortly after they decrease to 9 or 8, and then deepen again, southward of Pulo Kitam, to 13 or 14 fathoms, and for some distance they are thus irregular.

Horsburgh observes that "The Old strait is from 2 to 1¼ miles wide, and in entering, a mid-channel track is the best, with proper attention to the lead. Several small rivers empty themselves into the Old strait; and in sailing through the small islands contiguous to Singapore should not be approached too closely. The soundings are irregular in passing Maljho river, and about mid-channel lies a reef of rocks: here the strait becomes much contracted, and abreast of Pulo Baru, where the reef is situated, it is steep-to, from 10 fathoms, with deep water in the channel, and the bottom is red clay; this is the narrowest part of the strait. The soundings again become regular, and the channel takes a S.S.W. direction to the entrance of the strait."

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The western entrance of the Old strait is the channel formed between Singapore island and Pulo Marambon. From Pulo Marambon, a shoal bank, with one and 2 fathoms water over it, stretches in a N.N.E. direction more than 2 miles, and a rocky bank fronts the coast of Singapore island opposite to it, and extending from it nearly half a mile, reduces the width of the navigable channel to one-third of a mile, and renders it very intricate. Abreast of Tanjong Kampong, the depths are 4 and 5 fathoms, deepening to 6 and 8 fathoms towards Pulo Marambon. Abreast of that island are 6 and 5 fathoms, and about three-quarters of a mile outside of it are 3 fathoms, on the edge of the bar which extends across the entrance. There are but 2 fathoms over the bar at low water springs, but just outside of it are 9 and 11 fathoms, deepening to 14 or 16 fathoms, mud, a little farther out.

Water.—Fresh water may be obtained in several of the rivers in the Old strait.

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CHAPTER III.

OBSERVATIONS ON THE PASSAGES ROUND THE CAPE OF GOOD HOPE TO SUNDA STRAIT, AND TO PORTS IN THE CHINA SEA; WITH A DESCRIPTION OF SUNDA STRAIT.

At all seasons of the year it is usual for vessels bound from Europe to Batavia, Singapore, Bangkok, Saigon, Sarawak, or Labuan, after rounding the Cape of Good Hope to steer as directed at page 154 for Java head, and to pass through Sunda strait into the Java sea; and, with the exception of those bound to Batavia, to enter the China sea by either Banka, Gaspar, or Carimata straits.

The route by Sunda strait and the China sea is also the direct and ordinary one for vessels bound to China and Manila; but those which pass St. Paul island between the middle of September and the middle of January, when the north-east monsoon is blowing in the China sea—especially those bound to Shanghai or other northern ports either in China or Japan—generally proceed by some of the channels eastward of Java, and enter the Pacific ocean by Macassar strait, the Molucca or Gillolo passages, or by Dampier strait, which are recommended by Horsburgh as the most eligible routes at this season; whilst other vessels during this period enter the Java sea by Sunda strait, and then proceed by some of the channels eastward of Borneo.

It is not, however, at all an uncommon practice for fast sailing vessels bound to China to proceed through Sunda strait and beat up the China sea against the north-east monsoon (page 153); and in weighing the advantages of the two routes, it should be borne in mind that the Eastern passages are but imperfectly known; indeed but little has been added to our knowledge of them since Horsburgh's time, whereas the hydrography of the China sea has been improved by the results of several Admiralty surveys.

Banka strait possesses unquestionable advantages over those of Gaspar and Carimata, and is without doubt the best and safest route into the China sea. It was carefully surveyed in 1859 by Messrs. Stanton and Reed, Masters R.N. in H.M. surveying vessel *Saracen*, and

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subsequently by Lieutenant Keuchanius, in H.N.M. surveying vessel *Pylades*, so that no part of the Eastern seas, probably, has been so thoroughly explored, and had so much labour expended upon it, as this strait. Banka strait although of much greater length, and not so direct for vessels bound to China as Gaspar strait, yet it is manifestly superior, being easy and safe of approach ; affording convenient anchorage in every part, which enables vessels to avail themselves of favourable winds and tides, and leading into a part of the China sea free from danger. Gaspar strait, on the contrary, is difficult and dangerous of approach, rocks and shoals extending for 35 miles to the southward; the depths of water are too great to afford convenient anchorage; and it conducts into a part of the China sea very imperfectly explored, and abounding with hidden dangers, amongst which vessels are liable to be set by uncertain currents.*

For vessels proceeding to Singapore, Banka strait should therefore be preferred, and it has in fact become the recognized highway of the trade passing between Sunda strait or Batavia, and Singapore. In order to facilitate its safe navigation, the Dutch have established a light on Kalian point, and have intimated their intention to establish additional lights, so that vessels may pass through at night, with ease and safety. But for ships bound to China, Gaspar strait being shorter and more direct, is still preferred, and will no doubt continue to be by many navigators, especially those who are anxious to make quick passages, even at the expense of incurring additional risk. It is certain that a vessel arriving off the entrance of Banka or Gaspar strait in the morning, and favoured with a fair commanding breeze, would gain some advantage in point of time by passing through the latter; but in calms and light airs, or against the north-east monsoon, there is good reason to believe that vessels will make quick, and often quicker passages, by proceeding through Banka strait, carefully attending to the directions given in Chapter 5; and they will always be assured of much greater safety. In thick or bad weather, it is possible to proceed through Banka strait without risk; but Gaspar strait can never be approached at such times without incurring considerable danger.

Vessels bound to Singapore, and having passed through Banka strait, may proceed either outside Linga and Bintang islands, and making Horsburgh lighthouse, enter Singapore strait from the eastward; or, passing outside Linga and inside Bintang, proceed through Rhio strait into the middle of Singapore strait; or they may proceed inside Linga, through Varella, and Durian straits, and passing the Raffles light-

* The Nautical Magazine for 1861 mentions that nine vessels were lost in Gaspar strait that year, and that five vessels were lost in that strait during a period of six months.

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house, enter Singapore strait from the westward. The first of these passages is known as the Outer route, the second as the Middle route, and the third as the Inner route.

The Middle route, by Rhio strait, is the one now generally adopted, being safe, sheltered, and easily navigable, the Dutch Government having placed beacons on many of the dangers; whereas the route outside Bintang is exposed in both monsoons, and there are many out-lying rocks and shoals, which render it necessary for vessels to keep at a great distance from the land.

The Inner route, by Varella, and Durian straits, is adopted when the north-east monsoon is blowing strong in the China sea, at which time vessels may proceed by it speedily and comfortably, instead of beating about outside against a heavy sea and an adverse current.

The Main route up and down the China sea is that by Pulo Sapatu, and Macclesfield bank. In the south-west monsoon, therefore, vessels bound to China, and having passed through any of the above straits into the China sea, may proceed as most convenient through the islands lying between Singapore strait and Borneo; and passing on either side of the Anamba islands, shape a course to sight Pulo Sapatu; thence to cross Macclesfield bank, and on to China.

In the strength of the north-east monsoon it is always difficult, and sometimes impossible, to work up the Main route of the China sea, and it is never attempted except in fast sailing clipper vessels. Late in the monsoon, vessels frequently work up by keeping close to the western edges of the reefs, where the current is never so strong against them, and is often in their favour.

Vessels in this monsoon, however, more frequently proceed by the Palawan passage, which they may enter by passing between North and South Natuna islands, and between Royal Charlotte and Louisa shoals, which is the ordinary route, and generally recommended; or they may pass between Tanjong Api, the north-west point of Borneo, and South Natuna, by the Api passage, and along the coast of Borneo inside Luconia shoals, to the Palawan. This last is an excellent route for steam vessels from Singapore, as light winds and smooth water will often be found close to the coast of Borneo, when it is blowing hard with a heavy sea outside in the ordinary route.*

CAPE OF GOOD HOPE TO SUNDA STRAIT.

WINDS in the INDIAN OCEAN.†—The south-east trade wind which in the Indian ocean extends from the west coast of Australia

* *See* China sea Directory, Vol. II., pages 10 to 17.

† *See* Admiralty Wind and Current charts for the Pacific, Atlantic, and Indian oceans, 1875.

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to within a few degrees of Madagascar, will be found between the parallels of 4° and 25° South, from April to September, and between 10° and 30° South, from November to March. To the southward of this trade, as far as 60° or 70° S., the prevailing winds are westerly, which will be found with more or less force and irregularity at all seasons.

The monsoons to the southward of the equator in the Indian ocean blow from S.E. from the middle of April till the middle of September and from N.W. varying to W.S.W. from October till March. These monsoons extend from near the African coast far into the Pacific ocean, and from the equator to the parallel of 8° or 9° S., and near Australia, to 12° or 14° S.

The south-east monsoon, which is the period of fine season, may be considered an extension of the south-east trade, blowing within three or four degrees of the equator when the sun is near the northern tropic, and receding to 10° or 11° S. when the sun is near the southern tropic.

The north-west or westerly monsoon is subject to many irregularities, with occasional heavy gales, thunder, lightning, and rain; it sometimes does not set in before November or December, rarely blowing with regularity and strength except in December and January, when it occupies a space comprised between lat. 10° or 12° S., and 2° or 3° N.

DIRECTIONS.*—On leaving the Cape of Good Hope steer boldly to the southward, so as to run down the easting in lat. 39° or 40° S., where the wind blows almost constantly from some western point, and seldom with more strength than will admit of carrying sail; whereas in a higher latitude the weather is frequently boisterous and stormy, with sudden changes of wind.†

In the South-east Monsoon, that is from the middle of April to the middle of September, vessels, having passed St. Paul island, should not edge away too quickly to the northward, but should endeavour to reach first as far to the eastward into the south-east trade wind as the meridian of Java head, crossing the southern tropic in about 102° E. In this season a westerly current runs along the south coast of Java, and in the months of June, July, and August, when it is at its greatest strength, it will be indispensable to be well to the eastward, or otherwise the ship will be liable to fall to leeward of Java head. In the vicinity of Java the south-east monsoon also veers sometimes to East or E.N.E.

* *See* Admiralty charts:—Indian ocean, No. 2483; scale, $m = 0{\cdot}2$ of an inch; Indian ocean, sheets I. and II., Nos. 748*a* and 748*b*; scales, $m = 0{\cdot}5$ of an inch: also Ice chart of Southern Hemisphere, No. 1,241.

† Some navigators prefer making their easting in a higher latitude than 39° or 40° S. whilst others steer a more direct course for Java head than is here recommended: but the above directions are those usually followed in H.M. ships, and are generally believed to be the best.

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In the North-west Monsoon, that is from the middle of October to the middle of March, but especially in December and January, the southern tropic should be crossed several degrees to the westward of the meridian of Java head, when a direct course can be steered for Sunda strait, or to make Engano island, or the land about Flat cape, the southern extreme of Sumatra. Great care must be taken during this monsoon not to fall to leeward of Java head, for the westerly winds blow with great violence along the south coast of Java, and their strength, united with the strong current setting to the eastward, make it impracticable to work to windward along this coast; a vessel may thus have to steer to the southward, and re-enter the south-east trade, in order to make sufficient westing to fetch Flat cape. When nearly on the parallel of Java head, and one or two degrees to the westward of it, a direct course may be steered for the strait, with an allowance for a probable current setting to the southward.

If contrary winds be met with shortly after leaving St. Paul island, in November, December, or January, a vessel may steer at once to the northward, and cross the tropic in 80° or 90° E., when she will meet with westerly winds to carry her to the strait.

Shifting of the Monsoons.—During the periods when these changes occur, that is from about the middle of September to the end of October, and from about the middle of March to the end of April, the winds are variable and uncertain. It is advisable at those times to make sufficient easting in the south-east trade, to bring Java head nearly North, and then to steer direct for it, borrowing a little to the eastward or westward, when it is approached, as may be required by the prevailing wind or other circumstances.

GLENDINNING SHOAL.—Caution.—Captain Glendinning of the English barque *Queen Mab*, 1860, reports having passed a dangerous shoal situated about 130 miles N.N.E. (true) from the Cocos or Keeling islands, in lat. 9° 54′ S., long. 97° 50′ E. (approximate), and lying directly in the track of vessels from Sunda strait to the Cape of Good Hope during the south-east monsoon. Discoloured water was observed for a distance of 10 miles, but 7 fathoms was the least water obtained on passing the shoal.*

JAVA HEAD,† the western extremity of Java, in lat. 6° 46′ 40″ S., long. 105° 11′ 15″ E., is a bluff promontory at the foot of high land, and is discernible at a considerable distance in clear weather.

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* In 1865 H.M.S. *Serpent*, Commander C. Bullock, passed over the reputed position of the Glendinning shoal. No indication of the existence of such a shoal was found and no bottom was obtained with 140 to 470 fathoms of line, over a space of 30 miles.

† *See* Admiralty charts:—Sunda strait, No. 2,056; scale, $m = 0{\cdot}3$ of an inch; and Eastern Archipelago, western portion, No. 941*a*; scale, $m = 2{\cdot}75$ inches.

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CAPE SANGIAN SIRA.—From Java head the coast trends S.E. by S. about 3½ miles to Palembang point, which is 2 miles northward of cape Sangian Sira the most southern point of this part of Java, in lat. 6° 52′ S., long. 105° 14′ E. From this cape, and 1½ miles to the southward, several rocks project, some of which are above water. The soundings are very deep close to these rocks, and along the shore as far as Java head there is no bottom with 100 fathoms; but as the breakers which line the whole coast seem to indicate that there are rocks under water, it will be advisable to give the shore a berth of at least 2 miles in passing.

From cape Sangian Sira the soundings decrease in the direction of Klapper island to 40 and 20 fathoms; while farther eastward, between this island and Trowers island, they decrease from 20 to 12 fathoms.

KLAPPER, or Breakers ISLAND, named by the Malays, Pulo Deli, lies 8 miles from the nearest shore of Java, and about 18 miles S.E. by E. ½ E. from cape Sangian Sira. It is very low, covered with large trees (those along the beach being cocoa-nut), and is surrounded by a reef, which in many places stretches off a mile; but on the north-west side there is a good watering place, as boats can enter a little river through a channel with reefs on both sides, and vessels may anchor in 18 to 24 fathoms, clay bottom, 2 miles from the island, close to those reefs which partially dry at low water. According to Captain F. H. Ampt, of the Netherlands Royal Navy, this is a good watering place in the south-east monsoon. The depths are from 30 to 40 fathoms at 4 miles off the south shore of the island.

TROWERS ISLAND or Pulo Tinjil, is nearly of the same circumference and outward appearance as Klapper island, from which it lies E. by N. distant 13 or 14 miles. This island is also surrounded by a reef; and according to the natives, there is a fresh-water spring, but Captain Ampt, after a most arduous search, could not discover it.

On the north, and west sides of this island there are from 13 to 19 fathoms water, and at the south-east, and south sides, at some distance, no bottom at 50 and 100 fathoms. Captain Klein, who lost the *Cheriton* here in 1847, reports that, a mile to the northward of the island there is a rock on which the native proas have sometimes struck. Everywhere else round the island from 13 to 19 fathoms will be found, and at a short distance to the southward more than 100 fathoms.

CAUTION.—Along the coast to the northward of Klapper and Trowers islands, as far as cape Sangian Sira, there are rocks which in some places lie 1½ and 2 miles off; and no shelter whatever can be found there from S.W. and S.E. gales. Lieutenant B. G. Escher, Netherlands Royal Navy, in 1837, discovered a shoal with 15 feet water, lying to the eastward

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of Sodon point, about 1½ miles from the shore. It bears N. by E. from the east point of Klapper island, and N.W. by W. ¾ W. from the west point of Trowers island.

When making Java head in hazy weather, the appearance of the land to the eastward of cape Sangian Sira, between it and Sodon point, bears much resemblance to the high land of the west point of Java, with the adjacent hills on Princes island ; and the low land in such circumstances not being distinguishable at a distance, the position of it is often mistaken for the entrance to Princes channel.

SUNDA STRAIT.

Variation 0° 45′ East, in 1878.

GENERAL DESCRIPTION.—Sunda strait, through which passes a large portion of the trade of China, as also most of the trade of Batavia, Singapore, and other ports in the Java and China seas, separates the large islands of Java and Sumatra. Between cape Sangian Sira the most southern part of the western extreme of Java, and Flat cape the southern extremity of Sumatra, which form the western limit of the strait, the distance is 68 miles, in a N.W. ½ N., and S.E. ½ S. direction; and from the western, to the eastern limit of the strait, which lies between St. Nicholas point the northern extreme of Java, and the opposite coast of Sumatra, the distance is 74 miles ; the general direction of the track for shipping being about N.E. and S.W. The narrowest part of the strait is at its north-east end, where the distance between Fourth point in Java, and Hog point in Sumatra, is but 13 miles. This part of the strait is divided into two channels, each about 4 miles wide, by Thwart-way island, which, no doubt, received its name from the circumstance of its lying right in the middle or fairway of the narrowest part of the strait.

In the strait are several islands forming different channels, by which it may be entered from the westward; but Princes channel and Great channel, both on the south side, are those most commonly used.

The Great channel is limited on the north side by the conspicuous Krakatoa island, between which and the coast of Sumatra are three channels, formed by Bezee, and Sebooko islands.*

Winds.—In Sunda strait the wind varies from S.S.E. to E.S.E. during the south-east monsoon ; and from W.N.W. to N.W. in the north-west monsoon. There are also alternate winds, blowing from South before noon, and from North after noon.

* *See* Admiralty charts:—Sunda strait, No. 2,056 ; scale, $m = 0{\cdot}3$ of an inch : and Sumatra island, sheet II., No. 2,761 ; scale, $m = 0{\cdot}1$ of an inch.

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Tides.*—In the narrow part of Sunda strait the tides are greatly influenced by the winds, and frequently resemble currents more than regular tides.

During the south-east monsoon, in Anjer road, the ebb often sets to the westward from one to 2 miles an hour, continuing to run sometimes about 14 hours, with a slack or flood of 6 hours; off Thwart-way and Button islands it often runs 14 hours at a time to the south-west, from 2 to 3½ miles an hour, then changes and sets to the north-westward, and northward with much less velocity. At other times the ebb sets for about 6 hours to the south-west, and the flood for about the same time to the north-east with nearly equal velocity, about 3 or 3½ miles an hour at springs.

During the westerly monsoon, between Java and Thwartway, the tide has also been found to run 3 or 3½ miles an hour when at its greatest strength, the ebb 6 hours to the south-west, and the flood the same length of time to the north-east; but during strong westerly gales the flood frequently runs longest. In this season the tide or current on the opposite side of the strait sets off from the Sumatra coast, about Zutphen islands, towards the middle of the strait, or the Java shore; and from December to February, the ebb tide along the Sumatra coast, between North island and Hog point, has been found to run generally to the southward from 4 a.m. until 6 p.m., and the flood weakly to the northward during the night. In February and March a strong current of 4 to 4½ miles per hour sets sometimes in among Zutphen islands to the W.S.W., or round them towards Hog point, which requires great caution in ships passing those islands.

SOUTH SHORE.

PRINCES ISLAND, or Pulo Panaitan, separated from the west part of Java by Princes channel, is the largest island in Sunda strait. Its greatest length, between the west and north-east points, is 12 miles, and its breadth about 8 miles. It is of an irregular form, projecting to a point on the north-east side, and having a large bay on the south-west side, the horns of which form the west and south points of the island. The middle and eastern parts of the island are hilly, the highest peak, 1,450 feet above the level of the sea, being on the eastern shore; but in some parts, particularly at the west end, the land is level and low fronting the sea; all parts of the island abound in wood.

The west point of Princes island is fronted by a reef to the distance of about 1½ miles, several rocks of which are seen above water; on the north-

* Horsburgh, Vol. I., eighth edition, page 797.

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west, and north sides, the island is steep-to close to the fringe of reef which edges those shores.

A fringe of reef extends from the north-east point of the island, and along the shore on each side. A similar fringe extends about a third of a mile off the south-east point of the island; nearly 2 miles W.S.W. of which, close in shore, and near a conspicuous White rock, is a coral reef, upon which the sea is always breaking.

Casuaris bay, on the south-west side of the island, is 4 miles deep, and has at its entrance soundings varying from 30 to 50 fathoms, decreasing inside to a convenient depth for anchoring; but being open to all winds between west and south, it is not frequented, and cannot be recommended.

Water.—According to Horsburgh a ship in want of water may anchor on the eastern side of this island in 35 fathoms, soft ground, about half a mile from the shore, with the peaked hill bearing about N.W. by N., and fresh water may be obtained here from a stream in the eastern part of a small sandy bay, where the casks must be filled at about 100 yards up, the higher the better, otherwise the water will be brackish.

It is, however, only in the north-west monsoon that water can be procured here, for in the south-east monsoon all the springs are dry from want of rain, and there is, moreover, no safe anchorage in this monsoon along the east side of the island, as it is a dead lee shore.

CARPENTER ROCKS are a group about a mile in extent, projecting from the south point of Princes island. Most of the rocks are above water, and the sea is usually breaking over them. There is no bottom at 50 fathoms a short distance from these rocks.

PRINCES CHANNEL, between Carpenters rocks off the south end of Princes island, and Friars rocks off First point of Java, is 3 miles broad at its narrowest part, and possesses the great advantage of affording anchorage to vessels when becalmed, which Great channel does not. Light baffling winds and calms are very common about the entrances to Sunda strait, occurring even in the strength of the south-east monsoon, and vessels when not able to anchor are liable to be set back by adverse currents.

The depths in this channel are much greater on the Princes island, than on the Java shore. Close to Carpenter rocks there is no bottom at 50 fathoms; with Peaked hill, on the south-east part of the island, bearing from N. $\frac{1}{2}$ W. to W. by N., there are 10 to 30 fathoms, coarse sand, shells, and coral, little more than a cable off shore; with the same hill bearing from N.N.W. to S.W. there are 36 to 44 fathoms about a mile from the shore. Towards Mew bay, on the Java shore, the depths decrease to 20 fathoms and less.

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Directions.—In the south-east monsoon, when proceeding either way through Princes channel keep closer to the Java coast than to Princes island.

In the north-west monsoon it often happens that vessels outward bound get very quickly to the westward by proceeding through Princes channel, while those using Great channel are detained by heavy squalls and adverse currents. Indeed, instances have occurred in which ships have worked through this passage in a remarkably short time during a westerly gale, by carrying a heavy press of sail, and tacking between the sqalls, when it was impossible for any ship in Great channel to beat against the current and heavy sea.

Proceeding through Princes channel in this monsoon, keep near Princes island and Carpenter rocks, especially when working out against westerly winds, for a current will then sometimes be found setting to the westward.* It is, moreover, very important to keep close to Carpenter rocks when working out, to avoid being set upon the rocks near Java head and Palembang point by the heavy swell, for being once outside anchoring ground, and in a calm, a vessel would have much trouble to clear the coast of Java. The south-east coast of Princes island must not, however, be approached within a mile.

GREAT CHANNEL lies between the north point of Princes island and the south point of Krakatoa island, which are 23 miles apart; and although too deep for anchorage, it is much frequented, being the widest passage into the strait, and is considered to be, with the exception of the doubtful Hoedek rock, clear of danger. If the strait be entered by this channel, keep Princes island aboard, and when farther in the strait keep on the Java shore.

Hoedek Rock is said to lie about 5 miles S.W. ¾ S. from Krakatoa. Captain Drury, R.N., is reported to have examined a rock S.S.W. of Krakatoa some years ago, and found it to be near the water's edge.† The *Abdul Hassim*, drawing 14 feet, is also said to have struck upon a rock, from which the peak of Krakatoa bore N.E. ½ N., distance from the nearest part of the island 6 miles. There is, however, reason to believe that no rock exists in this locality, for Mr. Richards, commanding H.M. surveying vessel *Saracen*, carefully sounded over it in 1854.

FIRST POINT and FRIAR ROCKS.—The coast between Java head and First point forms a bight, and is fronted by high rocks stretching out a considerable distance in some places. First point, or Tanjong Along-ajang, the south point of entrance into Princes channel, has

* Horsburgh, Vol. I., page 790.

† Seaman's guide round Java, page 32.

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a conspicuous rock lying abreast of it, which rises abruptly out of the sea, and is steep-to, so that with a steady wind a vessel may pass close to it. Close to the northward of First point there is another rock above water, which together with the former are named Friar rocks.

Light.—The white, stone lighthouse on First point, exhibits from an elevation of 315 feet above high water, a *revolving* white light, showing *two* flashes *every minute*, each flash being of *six seconds* duration, followed by an eclipse of *twenty-four seconds*, the light should be visible in clear weather from a distance of 25 miles.

MEW ISLAND, or Pulo Kanti, lying about 2¼ miles eastward from First point, is nearly 2 miles in extent north and south, and one mile east and west. The island is hilly, and abounds with wood. Between it and First point, and close in-shore, is a small islet or rock above water, called the Mew stone. The shore is rocky on the outside of Mew island, but safe to approach; the soundings decrease gradually to 8 or 9 fathoms.

Betwen Mew island and the main there is a narrow but safe channel, with depths from 10 to 5 fathoms, sandy bottom. When taking this passage, keep close in towards Mew island, to avoid Watson bank, which lies near the Java shore. Sometimes the sea breaks upon this bank, but between it and Mew island there are depths of 3, 5, and 10 fathoms, clay bottom.*

Water.—To the eastward of Mew island, on the Java shore, there is a good watering place in the south-east monsoon; the water is excellent, and is poured by a cataract upon the beach. Large boats may approach this spot at high water through a narrow channel in the reef, and fill the casks by a hose; at low water they will require a great length of hose to reach the boats.

A little to the northward of the watering place, and about half a mile from the Java shore, lies a coral reef about a cable in extent. Upon its shoalest part there is one fathom water, and all round from 5 to 6 fathoms. A vessel standing in for the watering place, must steer between this reef and the island, or rather nearer towards the island, and anchor in 9 or 10 fathoms.

In the south-east monsoon there is also a good anchorage a little farther out, with the north point of Mew island bearing about W. ½ S., and the east point S. by W., in 16 to 19 fathoms water, sandy bottom.

Plenty of wood may be got upon Mew island or the main land, but Horsburgh advises shore parties to be on the guard against any hidden assaults from the natives.

Tides.—It is high water, full and change, at Mew bay at about 6h.

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* *See* Admiralty plan of Mew bay, scale, $m = 1{\cdot}5$ inches, on chart of Sunda strait, No. 2,056.

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SECOND POINT, or Tanjong Gookoolang, consists of a low foreland somewhat broad in appearance, the western extremity of which lies about N.E. by E., nearly 9 miles distant from First point, and its northern extremity,—which is usually known as Second point—about 3 miles farther to the north-eastward. It may be approached without danger to the distance of one or even half a mile, and in from 26 to 20 fathoms water, the reefs projecting a little way off shore.

From Mew island towards Second point, reefs project half a cable from the shore, having very near them 5 to 6 fathoms water, which increases speedily to 10 and 20 fathoms; but with due care and attention to the lead, a vessel may approach the shore in order to anchor. On the coast there is scarcely any population, but sometimes proas may be met, having turtle, fowls, and cocoa-nuts for sale.

WELCOME BAY.—At a distance of 20½ miles N.E. by E. from Second point is Third point, and between is a deep bight, named Welcome bay, which in the south-east monsoon affords good shelter, but should be avoided in the south-west monsoon. There is, however, good anchorage in the south-west monsoon, when the wind is not too northerly, south-eastward of Second point in 9 or 10 fathoms water; but this anchorage should be approached with great caution, as the soundings decrease very suddenly near Second point, and a shoal* with 12 feet water on it and 6 fathoms close-to, extends half a mile off shore between Second point and Tambing point.

The west side of the bay trends from Second point about S.S.E. ½ E. 11 miles, about the middle of which the beach forms a small bight, with 4 fathoms at its entrance, but only one fathom a short distance within. The whole of this side of the bay is skirted by reefs, some parts of which are a mile distant from the shore.

Lieutenants Rietveld and Boom, Netherlands Royal Navy, surveyed Welcome bay in 1841, and determined the positions of the shoals and islands given below. A large portion of the bay, inside Panter and Rocky ridge reefs, has not been examined, but it is supposed to be dangerous.

Andellan, and Little Andellan, are two small islets lying contiguous to the south-west shore of the bay, about 8 miles from Second point, and 5 from Rocky ridge. Three sand-banks, each surrounded by a sunken reef, lie from half to three-quarters of a mile off these islands, in a N.N.E., East, and S.E. direction. Between these banks and Andellan are from 4 to 6 fathoms, mud; and between that island and the shore from three-quarters to 1¾ fathoms. Near the head of the bay, to the eastward of Rongit islet, is a fourth bank.

The distance across from the southern shore of Welcome bay to the south coast of Java is about 3 miles, and the sound of the surf on the south coast may be distinctly heard across the isthmus.

* Captain C. Fellowes, H.M.S. *Cruizer*, 1857.

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The eastern shore of the bay is 22 miles in length, from the head of the bay to Third point, in a direction about N.N.E., and the general depths are 15 to 24 fathoms at some little distance from the coast. Several islets and dangers lie off this shore. Baddoe is a small islet, surrounded by a reef, lying about 5 miles from the head of the bay, and about 1½ miles north-west of Tankyngi Parrie point. Between this point, and the islet are many coral rocks, for the most part dry at low water, with depths of 7 to 9 fathoms between them.

A large coral rock above water, usually covered with a heavy surf, and appearing of a bright white colour, lies W. ½ N., about 1½ miles from Baddoe islet; and near it appear to be several reefs. Between the rock and the island are 6 to 12 fathoms water.

Five or six miles north-eastward of Baddoe islet is Plaggan point, with some islands off it, the southernmost of which is named Mangir, and the others War, Oemang, and Sœmoer. These islands, as well as Plaggan point, are surrounded by reefs, a cable in breadth, but at a mile outside there are 15 fathoms, mud bottom.

Rocky Ridge is an extensive reef mostly above water, and always covered by breakers, by which it may be distinguished at a great distance. It lies about half way between the western shore of the bay and Panter reefs; and from it Second point bears N.W. by W. ¾ W., the south point of Baddoe islet S.E. by E. ¾ E., and the east point of Andellan islet S. ½ E. That part of Rocky ridge which dries at low water is about 100 yards in length, and the breadth of the surrounding reef the same. The soundings round it are 10 and 12 fathoms increasing at some distance to 18 and 19 fathoms.

Panter reefs are the outermost of the known dangers which encumber Welcome bay, and they lie nearly midway between Second point and Plaggan point. From their north extremity, in 11 fathoms, Second point bears W. ¾ N., Third point N.E. ½ N. 16 miles, the east point of Andellan island S. by W. ¼ W., and the south-west point of Baddoe islet S.E. ½ S. They consist of four different patches, lying in a N.N.E. and S.S.W. direction from each other, the whole being from half to three-quarters of a mile in extent. The shoalest patch has 1½ fathoms water, rocky bottom, but between and close round them are 9 and 10 fathoms, mud.

East and west of these reefs are 17 and 18 fathoms, and to the northward 20 and 25 fathoms.

CAUTION.—Welcome bay appears to be full of dangers not surveyed, and should be entered with extreme caution.*

THIRD POINT, or Tanjong Lussong, like Second point, is very low, although sharper, and fronted by rocks to the distance of 2 cables,

* Captain C. Fellowes, H.M.S. *Cruizer*, 1857.

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from which the depths increase to 10 and 18 fathoms. The peak of Krakatoa island bears N.W. by N. from it, and is distant about 21 miles.

PEPPER BAY.—N.E. by E. ½ E. 11 miles from Third point is Papolle island, and between is Pepper bay, which is formed by the coast trending from Third point to the southward for a distance of nearly 5 miles. Its shores are fronted by reefs which near the points project about half a mile, increasing their distance from the shore towards the depth of the bay, where they extend 1½ miles. The bay is also encumbered with two dangerous reefs known as Coral bank and Panjang reef. The soundings in the bay generally decrease uniformly from 14 to 10, 5, and 4 fathoms; the latter depth will be found 2 miles off shore. In the eastern monsoon there is safe anchorage N.E. of Lawvengan isle, in 6 or 8 fathoms, soft bottom.

Coral bank.—Nearly 2 miles east from Third point is a coral bank, the greater part of which is above water, and readily distinguished by its bright white colour. The direction of this bank is S.E. by E. and N.W. by W., about 3 cables in length, and from it Third point bears W. ¼ S., the north-east point of Lawvengan S.E. ½ E., and the west point of Papolle N.E. by E. Between this bank and Third point there is a channel of 4 to 9 fathoms water, and the depths increase quickly from 7 to 15 fathoms at the distance of a mile.

Lawvengan islet, situated at the head of Pepper bay, E. by S. ¾ S. distant 3½ miles from Third point, is about three-quarters of a mile long, in a N.W. ½ W. and S.E. ½ E. direction, a quarter of a mile broad, and is surrounded by a reef which projects 1½ cables from the north side of the islet.

Three-quarters o a mile to the north-westward and to the westward of Lawvengan islet are two reefs, partly dry at low water, and usually breaking.

To the southward, and mid-channel between Lawvengan isle and the shore, is a reef with only 3 feet water upon it, between which and the island there is a narrow channel with 3 and 4 fathoms; but between it and the shore are several small coral reefs that dry at low water.

Panjang reef is a ledge of rocks, the north-west point of which bears W. by S. ¾ S. 1½ miles from the north-west point of Papolle island. It is a mile long, in a N.N.W. and opposite direction, and half a mile in breadth, and the shoalest water upon it is 3 feet, and on some parts from one to 3 fathoms are found. This ledge is very dangerous as the sea does not often break upon it, and it cannot be approached by the lead, the depths very near it being 6 and 7 fathoms; but by keeping a good look-out it may be distinguished by the light colour of the water, and its brown patches.

Between Panjang reef and Papolle island, the soundings are 7 to 4 fathoms, mud bottom; and on the east and south-east sides of the reef, 5 to 3 fathoms, towards the shore.

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PAPOLLE ISLAND, small, round, and about half a mile in diameter, lies within a mile of the shore, with which it is connected by a reef; there is, however, a channel of 1½ fathoms through this reef, fit for the navigation of proas.

TYRINGIN REEF, lying 2 miles north of Papolle island, and two-thirds of a mile off the shore near Tyringin, is of coral, partly above water, and generally breaks. It is half a mile in extent N.N.E. and S.S.W., and very steep, having close outside of it 6 fathoms water, increasing to 9, 12, and 15 fathoms at 2 miles distance from the shore.

Between this reef and a small rock near the shore, there is a channel of 3 fathoms, often used by large proas.

Anchorage.—A convenient anchorage will be found to the northward of Tyringin reef, at 1½ miles off shore, with Papolle bearing S. by E., and the flagstaff at Tyringin E. by S. or E.S.E., in 7 fathoms, clay bottom.

Supplies may be obtained at Tyringin.

The Coast from Tyringin, trends N. by E. and N.N.E., and may be approached, with due attention to the lead, to 2 miles distance, in 18 fathoms. The general appearance of the coast is low, though occasionally interrupted by hills and conspicuous rocky points.

CATHARINE BANK, lying about 4 miles to the southward of fourth point, and half a mile off shore, is a quarter of a cable in extent, N. by E. and S. by W., with some rocky points even with the water's edge, and in other places only half a fathom water; with a little breeze the sea breaks upon it. From its outer edge Fourth point bears N.N.E. ⅛ E., Krakatoa peak West a little southerly, and the west point of Thwart-way island N. ½ W.*

Outside this reef are 4 fathoms water, increasing to 10, 14, and 18 fathoms, the latter depth being within a mile of it; the channel between it and the shore has 3¾ and 4 fathoms, and is used by proas.

Directions.—With a steady and commanding breeze a vessel may steer N.N.E. from Third point for Thwart-way island, which is distant 30 miles; or a N.N.E. ½ E. course for 26 miles, which will place her 2 or 3 miles off Fourth point, when she may either proceed on her voyage or haul in for Anjer road. The winds, however, frequently become light and variable there, and she may be compelled to anchor, in which case these courses would lead too far from the land. For these reasons it is better to keep on the Java shore, avoiding, however, the dangers in Pepper bay, which should not be approached under a depth of 14 fathoms.

When the current is running to the westward in the middle of Sunda strait, an eddy will be experienced near the land, besides which, a vessel

* Seaman's guide round Java, page 11.

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may anchor anywhere along the shore, except near Fourth point, where the bottom begins to get foul and rocky. When working to the north-east, therefore, it is advisable not to keep too far out in the offing, in order to make the eddy available, and not to lose favourable anchoring ground, and perhaps be compelled to anchor in deep water.

Supplies.—Along the coast to the northward of Tyringin there are numerous villages (campongs), the inhabitants of which frequently board vessels with fruit, fowls, eggs, &c., and often with turtle.

FOURTH POINT, or Tanjong Tykorang, bearing N.N.E. ¾ E., distant nearly 27 miles from Third point, is low, but easily discerned from its numerous cocoa-nut trees. From it the nearest point of Thwart-way island bears N.N.W. 5¼ miles, and Krakatoa peak W. by S. nearly 27 miles.

Light.—On Fourth point stands a red stone lighthouse 35 feet high, which exhibits, at an elevation of 151 feet above the level of the sea, a *fixed* white light of the second order, visible in clear weather from a distance of 20 miles.

An additional white light in the line of the telegraphic cable, between Telok Betong and Fourth point, is shown between the bearings of S.E. ¼ S. and E. by S. ¾ S., visible 8 miles. Vessels should not anchor in the daytime with the lighthouse between these bearings, or at night with the two lights in sight.

The direction of the submarine telegraph cable (N. 54° W.) is painted in black on the lighthouse.

Three white buoys, having small Dutch flags on them, mark the position of the telegraphic cable between Fourth point and Anjer road. Vessels are not permitted to anchor inshore of these buoys.

Caution should be observed in approaching or rounding Fourth point, for a reef projects from it more than half a mile, with soundings of 20 fathoms close-to; outside, or to the northward, the depths increase quickly to 25 fathoms, and at 2 or 3 miles off the point to 30 fathoms. The point should not, therefore, be approached any nearer than 1½ miles when rounding it.

ANJER TOWN and ROAD.—At 2 miles E.N.E. from Fourth point, is the flagstaff at Anjer, in lat. 6° 3′ 10″ S., long. 105° 54′ 50″ E. The town is not easily perceived in coming from the westward, being situated in a bay where the houses are scattered amongst the cocoa-nut trees, and nearly obscured by them, and by a spur of a chain of hills inland. The easternmost of these is a sharp-peaked hill named Anjer peak, directly over the town, and is in line with it when bearing S.S.E.

The anchorage is N. by W. from the fort in from 12 to 19 fathoms water, soft ground. From a position in 16 fathoms, three-quarters of a

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mile off shore, the flagstaff of the fort bears S.S.E., Fourth point S.W. ¼ S., the Cap N.N.E. ½ E., and Button N. ½ E.; and from thence the soundings decrease uniformly to 9 and 8 fathoms at about a cable from the reef which fringes the shore. This is but an indifferent roadstead in the north-west monsoon, and landing is dangerous on account of the high surf. Horsburgh mentions an instance of a ship there being assailed in the month of April by a heavy gale of wind, driven from her anchors, and thrown on the rocky shore.

Supplies, &c.—In the south-east monsoon, vessels both outward and homeward bound, generally call here for water and refreshments, unless they are content to purchase the latter from some of the numerous native boats usually to be met with on the look out for vessels passing through the strait. Buffaloes, poultry, vegetables, and frequently hogs, sheep, and turtle are to be procured here: water may be had by employing the shore boats. Coals may also be obtained at a reasonable price.

The Dutch have a harbour-master, and also a few Javanese troops stationed at Anjer.

Light.—A *red* light, elevated 23 feet above high water, is exhibited from the western pier at Anjer town, and is visible in clear weather from a distance of 4 miles.

Caution.—Vessels should approach the anchorage of Anjer road with great caution, especially at night, paying particular attention to the lead. They should not attempt to anchor in less than 15 or 13 fathoms, or they will probably get too near the reef fronting the shore, very close to which are 8 and 7 fathoms water.*

† "In weighing from Anjer road with a westerly wind and flood tide a vessel should cast as quickly as possible with her head off shore, and shoot well into the strait, where she will have room and time to pick up her anchor; it being dangerous to keep a ship drifting in the road while heaving it close up, in consequence of a steep rocky point to leeward, named Lenning."

"Ships have frequently found themselves in dangerous proximity to this reef from anchoring in too small a depth of water; and with no room to veer in the event of sudden and violent squalls, which, as in most tropical countries, are very common in this strait."

THWART-WAY ISLAND, or Pulo Renjang, 450 feet high, lying in the middle of the narrowest part of Sunda Strait, is easily recognised by its irregular shape. It is 2¼ miles long, N.N.W. and S.S.E., and very steep all around, except at its southern extremity, where a reef pro-

* Many vessels have anchored in 11 and 9 fathoms, wishing to get as close in as possible, but it is not safe to do so for the reasons stated.

† Capt. J. D. Cuthbert.—Naut. Mag., 1843.

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jects 2 or 3 cables, on which a rock above water is visible.* The highest part of the island bears N. by W. ¾ W. 6½ miles from Fourth point, S.W. by W. ¾ W. from St. Nicholas point, and N.E. by E. ¾ E. from Krakatoa island.

The west side of the island forms a small bay, in which there is temporary anchorage in 16 or 17 fathoms pretty close to the reef. A 5-fathoms patch lies about a mile off this part of the island, with irregular depths, 10 to 26 fathoms, around it.

Channels.—The channel between Thwart-way and Java is the most convenient for sailing vessels, owing to the depths of water being but from 20 to 30 fathoms, whereas the channel between Thwart-way and Sumatra has 40 to 50 fathoms. The latter channel, described at page 187, is moreover encumbered with Stroom rocks, in dangerous proximity to which ships are liable to be set by rapid currents, and unable, from the great depth of water, to bring up by anchoring.† The narrowest part of the channel between the rocks off the south point of Thwart-way island and the reef off Fourth point is a little more than 4 miles; and the distance is the same between the south-east end of Thwart-way, and Cap island.

CAP ISLAND, or Pulo Oelar, is a small round island, about a cable in diameter, lying N. by E. 3 miles from Anjer, and about E.S.E. 4 miles irom the south-east end of Thwart-way island.

A shoal is said to lie nearly midway between Cap island and the main land of Java, from which Fourth point bears S.W., and Cap island N.W. by W. ⅓ W.‡

BROUWERS SAND is a dangerous bank lying nearly 2 miles off the Java shore, between Cap, and Merak islands. It is composed of very hard sand, and extends nearly 3 miles along the coast in a N.E. ¾ N. direction, its breadth being 2 cables. There are three shoal patches on the bank, the least water being 1½ fathoms at low tides, and the general depths 3½ or 4 fathoms. Its southern limit is 2¼ miles N.E. from Cap island; and its northern end forms with Merak island a channel 2 cables wide, with depths of 18 to 10 fathoms water.

* Captain J. B. Caldbeck states that the reef projects a greater distance than is generally supposed from the southern end of Thwart-way; and that at low water the sea breaks more than a mile from the island.—Naut. Mag., 1843.

† "With regard to the respective merits of these channels, being bound either way through the strait, the preference may be decidedly given to that between Anjer and Thwart-way, in consequence of the great rapidity and uncertainty of the tides in the neighbourhood of Stroom rocks, rendering their proximity dangerous, and unless in a strong breeze a vessel is almost unmanageable. The depth of water on Stroom rocks side is almost double that on the Anjer shore, except in a south-west line from Button island to Thwart-way. Instances have been known of vessels which, being drifted dangerously close to Stroom rocks, let go their anchors and run their cables out to the clinch; they were of course still whirled on until by a lucky chance they barely went past the rocks and no more."—Capt. J. B. Caldbeck. Naut Mag., 1843. Shortly after this account was written, a fine ship, the *Copeland*, of Liverpool, was lost by striking upon Stroom rocks.

‡ Mer. Mag., Vol. XVII., p. 123.

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Between this bank and the shore there is a channel a mile wide, with 6 to 10 fathoms water, which increases in the direction of Cap island to 15 and 20 fathoms. But in this channel a rock named Kroenjo, which partly dries at low water, lies 1½ or 2 cables off shore, with Cap island bearing S.W. by W. ½ W., Button island N.W. ½ N., and the west point of Merak island N. ¾ W.

The soundings close to the west side of Brouwers sand are from 10 to 15 fathoms, so that vessels should be cautious in approaching it; the depths increase to 19 and 20 fathoms at the distance of a mile, which is a proper distance to pass this danger. To avoid it, when standing in shore Cap Island should be kept inside of Fourth point, as Cap island in line with Fourth point leads just outside the edge of the bank.

GREAT MERAK ISLAND, or Pulo Merak Besar, lying N.E. ¾ N. 5½ miles from Cap island, is of considerable height, nearly round, and about half a mile in diameter. The island is bordered by a reef, which on the north-west side projects nearly a third of a mile.

LITTLE MERAK ISLAND, or Pulo Merak Ketchil, lies near the shore, abreast the north end of Brouwers sand, about half a mile to the south-eastward of Great Merak island. It is connected to the main by a reef of rocks, which is just under water, and consequently cannot be passed by laden boats.

MERAK HARBOUR is situated between Merak islands, and the main coast of Java. It is nearly half a mile in extent, having in mid-channel between the islands a rocky bank named Tarremboe, which partly dries at low water. The harbour may be entered by the channel on either side of this bank, as there are depths of 5 to 10 fathoms water in each. The channel into the harbour north of Great Merak is the better, as it is more than a cable in breadth, and has 6 to 14 fathoms. Entering by the southern channel keep nearer Merak islands than Tarremboe bank; entering by the northern channel keep Great Merak island shore aboard.*

Anchorage.—The anchorage with south-west winds is East from the highest part of Great Merak island, and northward of Tarremboe bank, in 6 to 11 fathoms, soft ground. The Java shore is steep-to. Sometimes a heavy swell sets into the harbour, therefore it is not considered safe for large vessels in the north-west monsoon, but small vessels will always find good shelter under Merak island.

The Coast from Great Merak island trends in a north-easterly direction about 4½ miles to St. Nicholas point. About midway between is a small islet, named Tempoza, lying close inshore. A reef fronts this coast, extending about a third of a mile from it, and passing just outside Tempoza; close to this reef are depths of 10 and 15 fathoms. The shore should not

* *See* Admiralty plan of Merak harbour; scale, $m = 2 \cdot 25$ inches, on chart of Sunda strait, No. 2,056.

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be approached nearer than half a mile, or in less than 20 or 18 fathoms water. The soundings increase regularly from the shore to 30 fathoms; at a distance of 4 miles there are 40 to 50 fathoms.

BUTTON ISLAND, which is about the size of Cap island, is high, steep, and covered with trees. It lies well out in the fairway of Sunda strait, 5 miles to the north-eastward of Thwart-way island, and has 34 and 30 fathoms close-to; Button island bears from St. Nicholas point W. by S. ½ S., distant nearly 7 miles, and from Hog point E. ½ N. 11½ miles.

ST. NICHOLAS POINT is the extreme end of the high bold promontory forming the northern point of Java. Dangers extend about a third of a mile off the point, and close to them are 11 fathoms, and 32 to 35 fathoms at a distance of one to 2 miles.

Directions.—When proceeding to the northward from, or being abreast of Anjer road, steer to pass outside Cap island and inside Button island, at any convenient distance from either, taking care not to borrow too close to Brouwers sand in passing. When clear of that shoal and Button island, if bound to Banka strait, steer about N. by E. for Two Brothers; if bound to Bantam, or Batavia pass St. Nicholas point at about 2 miles.

NORTH SHORE.

The SOUTH COAST of SUMATRA, which forms the north shore of Sunda strait, between Flat cape on the west and Hog point on the east, a distance of 70 miles, is indented by two large bays, named Samanka or Keyser, and Lampong, the shores of which are fronted by numerous islands and rocks.*

FLAT CAPE or Pamantyoss point, in lat. 5° 59′ S., long. 104° 23½′ E., is the south-west extremity of Sumatra, and the north-west boundary of Sunda Strait; the narrow neck of land of which it is the western extremity separates the deep inlet called Keyser bay, on the east side, from Blimbing bay on the opposite side. The south part of this neck of land is low and woody, the east end of it bounding the entrance of Keyser bay, is named cape Rada or Ketyil, and is distant 10 miles from Flat cape.

Light proposed (1877).—The light will be a *flashing* light, showing *three flashes* in quick succession every half minute, followed by a short eclipse.

A reef fringes the shore of Flat cape and thence to cape Rada, but at a mile distant there are 7 to 10 fathoms.

Sliman rock, on which the sea breaks, has less than 3 fathoms over it, and lies with Tanjong Sliman (the S.E. extreme of Flat cape) bearing W. by N. ½ N. distant one mile.

* *See* Admiralty chart, Sumatra, west coast, sheet ii., No. 2,761; scale $m = 0{\cdot}1$ of an inch.

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Sand-bank.—At 2½ to 3 miles S.W. of Flat cape there is a narrow bank, partly consisting of reddish sand, with 8 and 9 fathoms water on it, about 2 miles in length, W.N.W. and E.S.E., and about a mile in breadth. The soundings outside this bank increase rapidly to 30, 40, and 50 fathoms, and inside of it there is a channel about 2 miles wide, with 12 and 14 fathoms.

LITTLE FORTUNE ISLAND, or Pulo Batu Ketchil, lies in front of Blimbing bay, just outside Sunda strait, N.W. by W. 9 miles from Flat cape, and about 5 miles from the main; it is low, woody, about a mile in diameter, and surrounded by a reef also a mile in extent.

BLIMBING BAY is inside Little Fortune island, and northward of Flat cape. At its entrance vessels may anchor in 7 or 8 fathoms, and find a good berth with S.E. winds, but not with those from the N.W. Small vessels will be sheltered from all winds by anchoring farther inside in 3 fathoms, behind the projecting reef.

There is also anchorage off the east side of Little Fortune island, in 9 or 10 fathoms. In some charts two reefs are placed in this bay close in shore; it is very probable they do not exist, but it will be advisable to be careful.

Water.—On the east side of this bay is a small river, but its water is brackish; a fresh-water spring, however, may be found inside the south-west point, from which a reef projects a quarter or half a mile to the northward.

DIRECTIONS:—Approaching Sunda strait by night, the soundings will be a good guide in passing Little Fortune island and Flat cape. At 6 miles off shore the depths are 40 and 30 fathoms, and with a commanding breeze ships may venture into 20 or even 15 fathoms; but when too dark to distinguish the land, it is advisable not to shoal to less than 20 fathoms.

KEYSER or Samanka BAY, situated about 12 miles to the eastward of Flat cape, extends in a north-westerly direction about 30 miles, and is about 20 miles wide at its entrance. The western shore of the bay affords no shelter from south-easterly winds, and has 20 and 30 fathoms water within half a mile of it; the eastern side, north-westward of Kalang-bayang harbour, is not so steep, and affords good anchorage about 2 miles off, in 20 or 30 fathoms; but is also exposed to south-easterly winds.

Tamping bay, about 3 miles to the northward of cape Rada, the western entrance point of Keyser bay, is an open bight, but has good anchorage ground in depths from 12 to 15 fathoms, a mile off shore. A vessel will be exposed here to south-easterly winds, and will have much difficulty, on account of the rocky shore, in getting water from the shallow rivulets that discharge themselves into the bay.

The village of Borne is in the north-west part of Keyser bay, at the mouth of Samanka river, the water of which is good, but boats will find

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it difficult to enter. The land is low, and fronting the sea marshy. The best anchorage is East or E. by N. from the mouth of the rivulet, one or 1½ miles distant from the shore. Vessels lie here usually without danger from south-easterly winds, which seldom throw a very high swell so far up the bay. Near Betong point, the southern extremity of the bay near Borne, there is a rocky shoal which projects more than a mile in the offing, with 10 fathoms very near it.

LABOEAN ISLAND, lying nearly in the middle of the entrance of Keyser bay, is high and steep-to all around, the only anchorage being on the north-east side in 25 to 30 fathoms, sand, and very near the shore. According to Lieutenant P. A. Bloys, Netherlands Royal Navy, the anchorage is indicated by a bamboo house among the cocoa-nut trees near the beach, but he adds that it is a very indifferent berth in the western monsoon. There is fresh water, but the high surf renders landing difficult.

KALANG-BAYANG HARBOUR, on the eastern side of Keyser bay, and about East from the north point of Laboean island, was surveyed in 1845 by Lieutenants Prins and Boelen, of the Netherlands Royal Navy. It is small, but safe, and affords good shelter from all winds, with sufficient depths of water for large vessels; and may be easily recognised by the high and rocky Eyoe island, which lies about a mile outside, and can be seen 15 miles. Half a mile north-westward of Eyoe island lies Klappa island, with a single cocoa-nut tree upon it. There is a safe channel with 25 fathoms water between these islands.*

Supplies.—According to Horsburgh this harbour is well adapted for a fleet in want of refreshments, as every supply may be obtained; but the Java Guide says that refreshments are very scarce. Water may be obtained from a small rivulet in the north-eastern part of the oay, whence there is a road leading to the campong, or village, which is situated in a valley, about three-quarters of a mile from the landing place.

Directions.—In the north-west monsoon, enter the harbour by the western passage between Klappa island and Napal point, the north entrance point, and when the latter bears about West, or W. by S., anchor near the eastern beach in 10 fathoms, soft ground, or anywhere in the harbour, there being no hidden danger.

In the south-east monsoon steer in about N. by E., between Eyoe and Klappa islands. With a commanding breeze a vessel may pass eastward of Eyoe, between it and Vogel or Bird island on a N.N.W. course, or even between the latter island and the main, steering about N.W., but this channel is very narrow. All three of the last-mentioned channels lead close to Rover rocks, which are, however, easily avoided, and left to the eastward, as most of them are above water.

* *See* Admiralty plan on chart of Sunda strait, No. 2,056.

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KILOANG HARBOUR lies 5 miles to the south-eastward of Kalang-bayang, and also affords safe anchorage. It may be known by Tonkalie island, which is visible 12 miles, and lies off the south-east point of the harbour, being separated from the main by a small channel only fit for boats.*

Wood.—This harbour, as well as Kalang-bayang harbour, contains all kinds of wood.

Directions.—Coming from the westward or southward with a leading wind, steer for Tonkalie, till it bears East, distant 2 or 3 cables, when three groups of Black rocks will be seen, the southernmost of which bears N.N.W. from Tonkalie, and S.W. from the others. Steer N.E. and E.N.E. past these rocks in from 30 to 20 fathoms, for the eastern side of the harbour, which is very high, till Kiloang island bears West, where a good anchorage may be taken in 13 fathoms between it and the beach, and sheltered from all winds. Anchoring ground may be found in other parts of the harbour in 16 to 18 fathoms, but accompanied by a heavy swell. Kiloang island, which is small and not very high, lies near the eastern beach of this harbour, with some rocks at its northern and southern extremities, a large reef to the eastward and a smaller one on its western side. Although the bay outside Kiloang harbour is spacious, it is advisable to pass close to the westward of Tongkalie. It is unsafe to pass to the northward of Kiloang island, where there are but 3 and 4 fathoms, as a high swell sometimes breaks there. The Black rocks should not be brought to bear to the southward of West; nor is it necessary to run far in.

Vessels may run out with the land wind which blows here from the northward, but it is recommended to have a boat in attendance to tow, lest they should get becalmed under the high land.

Mountains.—The land of Sumatra, eastward of Kalang-bayang harbour and Kiloang bay, is very high, consisting of the Kalam bayang or Tanka mountains, 3,419 feet high; and 3 miles farther to the northward the Ratteh mountains, the southernmost peak of which is 5,096 feet above the sea. More westerly, and not far from the shore of Keyser bay, the Lampong mountains rise to the height of 6,560 feet and Keyser peak, situated 11 or 12 miles farther to the north-westward, and near the head of the bay, reaches to 7,412 feet.

PEPPER BAY is on the north shore of Lagoendy strait (page 179) on the west side of Tikoes point, the south-west point of entrance of Lampong bay. It has a large three-cornered rock in the middle, and is very limited; but the native proas row up behind the high western beach, where there are 18 fathoms water close in.

Batoe Blantang, on which the sea generally breaks, is said to lie S.W. ½ W. westerly three-quarters of a mile from the west point of Pepper

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bay, this rock is connected with a small island 1¾ cables north of it by an uneven ridge having 11 fathoms least water.

LAMPONG BAY, formed between Tikoes point on the west, and Rajah Bassa on the east, is about 20 miles wide at its entrance, and extends nearly the same distance in a northerly direction. Several islands line the western shore of the bay inside, between which and the main there are several good roads or places of shelter. In every part of the bay, from north to south, will be found from 10 fathoms, mud, to 20 fathoms, clay bottom.

The eastern side of Lampong bay, between Telok Betong and Choondong islands, is high, free from danger, and may be approached in safety to 14 and 15 fathoms, close-to. From Choondong islands to Rajah Bassa the coast, at 2 or 3 cables distance, is fronted by a line of rocks on which the surf breaks heavily with westerly winds, and renders landing difficult.

Dangers.—If a vessel keep outside the islands on the western shore of the bay there are but two dangers, both of which may be easily avoided. The first is a sand-bank, dry at low water, surrounded by a reef, which rises from 17 fathoms, mud, and bears E.S.E. 1½ miles from Kalagian island, and N.E. ¼ N. 2 miles from Pokowang island. The second is a reef with 2 and 1½ fathoms upon it, bearing S.E. ½ S. 1¼ miles from the easternmost of Choondong island.

PEDADA BAY, the first bight to the northward of Tikoes point, on the western side of Lampong bay, is 1½ miles wide at entrance, and 3½ miles deep.

Directions.—When running into this bay in the direction of the southern end of the Kalang-bayang mountains, on a W. ½ N. course, the soundings will be 20 to 15 fathoms, clay and mud, and the three small islands of Pedada, Penarian, and Lalanga will be seen. Pedada is the easternmost and highest, but N. by E. from it half a mile there are two detached reefs, usually covered with breakers; and a third reef N.E., which bears W. by S. from the north point of the bay. Keeping this last reef on the starboard bow, and the other two on the port bow, will lead to an anchorage in 15 fathoms water, very near the village of Pedada. This village is to the westward of Lalanga island, and stands on a clear fresh-water stream. The high rocky islet of Klappa is connected with Pedada point by three groups of rocks above water, leaving, however, between each of them a passage for small vessels. North-eastward of Klappa lie also three patches of rock, with 17 and 16 fathoms, clay, between them; to avoid them keep Satenga island to the westward of North. This small island is also high, with a reef extending about 2 cables from its north-east point.

POENDO BAY, lying 4 or 5 miles to the northward of Pedada bay, is 2 miles wide and and 3 miles deep, with 10 to 7 fathoms water.

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Across the entrance lies Pokowang, the largest island in Lampong bay except Lagoendy, with a peak on its northern side, and to the eastward a small island, to which it is connected by a reef.

Directions.—Poendo bay may be approached on either side of Pokowang. When taking the northern passage, which is preferable, the white coral reefs lying about 1½ miles north-east of Pokowang island are seen at some distance, but avoid the reef projecting 3 cables N.E. from the island, with 15 fathoms close to it. There is also a detached coral reef close to the north-west point of Pokowang, which must be kept on the port side, while the four coral reefs, now visible, and lying mid-channel N.W. and W.N.W. from the centre of Pokowang, should be kept on the starboard side. The depth of 8 or 9 fathoms, mud, will be found a convenient anchorage, Poendo village bearing West, and the south point of the bay S.E. When passing along the south side of Pokowang, or if when near Satenga island a W.N.W. course is steered, pay attention to the discolouration of the water on the 2-fathoms banks, which, like all the other visible coral reefs projecting from the south side of the bay, ought to be passed on the north side, keeping in 15 to 9 fathoms, a little less than a mile distant from the south shore of Pokowang.

RATEH BAY, just north of Poendo bay, is 3 miles in extent each way, with 16 to 18 fathoms, mud bottom, and at the entrance lies Kalagian island, which is high, and has a small islet separated from its south point by a boat channel of 3 to 8 fathoms water.

Not quite a mile S. by E. from Kalagian lies a coral reef, showing at low water like a black spot, and bearing W. by N. ¾ N. 1½ miles from the above-mentioned white coral reefs, between which there are 17 and 14 fathoms, mud.

Directions.—Rateh bay may be approached on either side of Kalagian; and the two reefs, which dry at low water, to the westward of the island, may be discerned at some distance, and, consequently, easily avoided. They are not in mid-channel, and lie N.W. and S.E. of each other, with 9 and 4 fathoms between them and Kalagian. Three rivulets on the western side of the bay lead to the villages of Sabo Rateh and Pinjindangon, and form a bank along the north-west coast, from half a mile to a mile off shore. Menanga village, on the north side of the bay, is moderately well inhabited, thence to the northward the population of the coast increases.

MAHITAM ISLAND lies off the north point of Rateh bay, with which it is connected by a reef. There is good anchorage on its north side, in 13 fathoms, mud bottom.

TAGAL ISLAND, flat topped and conspicuous, bears N.E. 1¾ miles from Mahitam, and about W. by S., 3½ miles from the Choondong

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islands. Between Tatal and the western shore there are some sand-banks, which obstruct the passage and leave but a small channel, with 15 fathoms, mud.

In the bay north-westward of Tagal there are two villages, Ringong and Urong ; and near the south point of the bay is the small island Laho, connected to the shore by a reef, which also projects to the northward. The general depth in this bay is 12 to 9 fathoms, mud, and on its northern side is the small island of Tampikel, attached to the main by a reef. North-east from this island, between it and Tankel island, there is a channel with 11 and 12 fathoms, mud.

Tagal island, with its flat top, is visible throughout the whole of Lampong bay. When coming in from the eastward, a vessel may steer for it on a N.W. bearing, and pass it in 15 fathoms ; and if entering from the southward it is also used as a mark for Lagoendy strait.

TANKEL ISLAND is 3 miles north of Tagal. The north side is low, but the south side high ; and from its eastern point a reef stretches off 2 or 3 cables, showing, at low water, some black spots, which may be passed in from 9 to 14 fathoms.

The Head of Lampong Bay, northward of Tankel, is about 4 miles wide, and contains four islands :—Pomogotang, 1½ miles North from Tankel, is all sand, but has some trees, and is surrounded by a large reef. Little Pomogotang, is a bank without trees, one mile W.N.W. from the former, and also begirt by a broad reef. Koeber island, lying S.W. from Pomogotang, is separated from the main by a 5-fathoms channel, and a reef extends 2 cables from its eastern side. Passarang is a low island, in Telok Betong road, S.E. from the river. Besides these islands there are some coral reefs, with depths varying from one to 4 fathoms : the eastermost of them bears N. ¼ W. from Tagal, and East from the south point of Passarang.

A reef, about 15 yards broad, with 4 to 8 feet water on it, lies 2 cables from the shore at the head of Lampong bay, with the west point of the easternmost Choondong island bearing S.E. ½ S. ; the west point of Tagal island S. ½ W. ; the south point of Pulo Passangan W. ⅔ N. ; and Apen or Monkey hill, N. ⅞ E. This reef, which is easily recognised by the discoloured water on it, has 7 fathoms near its south side, 8 fathoms on its east side, and 5 fathoms between it and the shore.

The eastern side of the reef is marked by a black beacon buoy, from which Harbour office, at the mouth of the river, bears N.W. ¼ N. ; Kobur island, S.W. ½ S. ; and foot of Apen hill N. ¾ E.

Telok Betong, situated in the north-western part of the bight, is the chief town in Lampong bay. Its population consists of natives of Sumatra and Bougies, with a Regent from the Dutch Government as their

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Chief. They trade with the Javanese in Lampong tobacco, which is highly esteemed; but this place being never visited by European vessels, fresh provisions are not to be obtained.

Light.—At Telok Betong a *red* light is exhibited at an elevation of 39 feet.

Directions.—When bound to Telok Betong, after passing eastward of Tagal, be careful not to bring its east point to the eastward of South in order to leave Pomogotang and the adjacent dangers to the westward. When Passarang bears West, or W. by S., and not less than a mile distant on account of its reefs, a good anchorage will be found in 7 to 9 fathoms, mud. The flagstaff, which will, however, be scarcely visible for the high trees, will bear W. by N. or W.N.W.

CHOONDONG ISLANDS are three in number, of which the northernmost is a steep rock, and the two others are larger, but not so high. Between them are narrow passages, with 12 fathoms water; and between them and the main, there are 14 to 10 fathoms, mud. From the easternmost island a coral reef projects S.E., 2 cables; and at 1¼ miles S.E. ½ S. from the same island, lies the coral reef, mentioned in page 174, with 1½ fathoms upon it.

KRANVOGEL or Crane Island, 9 miles S.E. from Choondong islands, and connected to the shore by a coral reef, with 9 fathoms close to its south and west sides, is difficult to discern, as it lies close to the high land, and consists only of a single rock; just to the eastward of it, however, there are some white limestone rocks on the shore.

LOBOGH or Blantong Bay.—To the northward of the Tiga islets, the Sumatra coast forms a deep curve called Lobogh or Blantong bay, with 4 or 5 fathoms, mud, and a salt-water river. The points of the bay on each side are covered with rocks on which there is a high surf.

A rock dry at low water, and on which the sea generally breaks, lies S.S.E. ¼ E., 1½ cables from Tanjong Blantong.

TIGA ISLETS.—These three rocky islets lying 3 miles off shore, appear as one when coming from the eastward, and do not begin to open until Rajah Bassa road is approached. The westernmost islet is the largest, and on its north-west side a reef projects 2 cables, and is indicated usually by breakers; between the two south-easternmost islets there is a channel with 18 fathoms water.

RAJAH BASSA ROAD.—The land forming the south-eastern part of Lampong bay is high, and rises to two conspicuous peaks, 3 or 4 miles inland, named Rajah Bassa mountains. According to Lieutenant Melvill, Dutch Royal Navy, the height of the north-west peak is 4,398 feet, and that of the south-east peak, 4,093 feet. Rajah Bassa road, which

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lies directly off the high land, was frequently visited by the China ships, it being an excellent place to obtain good water with facility and other refreshments, although Anjer (page 167) is still better.

According to Lieutenant Prins, Netherlands Royal Navy, there are three villages on the shore of Rajah Bassa road. The first is Kalinda, bearing N.N.E. ¾ E. from Tiga islets, and having in front of the white sandy beach some large rocks above water, between which there are openings that make it easy to land. The anchorage is in 7 to 10 fathoms, mud, West from the village, and a mile off shore.

The second village is Tyanti, which lies E.N.E. from the largest Tiga islet, and abreast that part of the road where the best anchorage is, and the best watering places.

The third village, named Rajah Bassa, is just to the northward of Cocoa-nut point, and about East from Tiga islets; it is the largest one of the three, but the watering there is difficult, at least much more so than at Tyanti, and the landing dangerous with westerly winds, as the coast there is always covered with high breakers. Boats which go for water ought to remain some distance off, drop their grapnels, and float the casks on shore.

The anchorage in Rajah Bassa road is between the Tiga islets and the rocky bank which fronts the shore, but a vessel should not come under 12 fathoms, for the bank in some places projects to the distance of half a mile, having 7 fathoms close-to. The best anchorage is a mile off shore, with Cocoa-nut point in line with Hog point, bearing S.E. by E., the north peak of Rajah Bassa E.N.E.; and the nothernmost Tiga islet, W. ¾ S., 1½ miles distant, in 12 to 16 fathoms, blue mud. On these bearings a vessel will be just abreast the watering places.

COCOA-NUT, Klapper, or Rajah Bassa Point, is low, covered with cocoa-nut trees, and bears N.W. by W. nearly 8 miles from Hog point, and E. by S. ¼ S. from Tiga islets.

BIGHT ISLANDS.—Between Cocoa-nut and Hog points the coast curves in to the north-eastward 2 miles, and at the bottom of this bight are the two small Bight islands surrounded by reefs. On the main land opposite their north sides is a village near a river, and proas and small vessels are sheltered there by a projecting point. The soundings throughout the bight are from 15 to 23 fathoms, decreasing near the shore to 10 and 8 fathoms.

TIMS or Collier Rock, 6 or 7 feet above water, and 6 yards in extent, lies 1½ miles north-westward of Hog point, and about one mile off shore. It is fringed by a reef, which on the north-east side projects about 17 yards. Another rock above water lies about a cable westward of Hog point, with deep water all round.

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LAGOENDY GROUP, lying in the south-west part of the entrance to Lampong bay, and 10 miles eastward of Tikoes point, consists of seven islands, viz., Lagoendy, Rond, Saka, Soengal, Mangoman, Sussarat, and Tims; they are uninhabited, but produce good timber, deer, and wild hogs. Along the southern shores of the first four islands, and also along the neighbouring coast of Sumatra, 40 and 50 fathoms, hard ground, are found close in, and the sea there in the western monsoon is very violent, but on their northern side boats can generally land. The following description is by Lieutenant Prins, Netherlands Royal Navy.*

LAGOENDY, the largest island of the group, is nearly 5 miles in length, E.N.E. and W.S.W., and close to the southward of its west point are two high, round-shaped rocks covered with verdure, N.E. ½ E. and S.W. ½ W. from each other, with a boat channel between them. On the S.E. side of Lagoendy there is another rock or islet of the same character.

On the north side of Lagoendy is Lagoendy harbour (named by Captain Owen, R.N., Nanga), small, but safe, with depths of 15 to 7 fathoms. In the middle of the entrance is the small island Pattappan, behind which a vessel may find good shelter from wind and sea. Captain Owen careened H.M.S. *Barracouta* here in February 1811, and moored her with the east and west points of the bay bearing respectively N.E. ½ N. and N.W., Pattappan island from N.N.E. to N. by W., a cable from the shore reef. Lieutenant Prins says there is room for several vessels, and that fresh water is found on Lagoendy, S.E. from Pattappan.

MANGOMAN ISLAND, lying a little outside Lagoendy harbour, has 15 to 22 fathoms, clay, all round it, except on its eastern side, where there are only 10 to 15 fathoms. When coming from the eastward or northward, a mistake may occur between this island and Pattappan, but the latter is lower and smaller than Mangoman.

LAGOENDY STRAIT, between Tikoes point and Lagoendy islands, is 2 miles wide, and may be recommended to vessels working out of Lampong bay in the N.W. monsoon. About mid-channel is Sussarat island, which is high, with 10 fathoms, sand, close-to, and 30 fathoms farther off. Near its west point there are some rocks, but they are high above water, and Lieutenant Prins adds, that although this island is in the middle of the channel, yet in a calm, vessels need not be alarmed by the current which seems to set towards it; for close-in, the same current will set them off again, and the ripples and green patches of water are of no consequence. The passages on either side of Sussarat are equally good, and with adverse

* *See* Admiralty plan of Lagoendy strait, scale $m = 0{\cdot}5$ of an inch, on chart of Sunda strait, No 2,056.

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winds or currents good anchorage may be obtained to the eastward of that island, in 10 or 12 fathoms.

A CORAL REEF, with 2 fathoms water, and 13 fathoms around it, lies northward of Mangoman island; from its north-east side the highest point of Sussarat bears S.W. by W. ¼ W.; the west point of Lagoendy S.W. ¼ S.; the north point S.E. ½ E.; and the middle of Mangoman S. ⅓ E. The reef is about 75 yards long, and cannot be distinguished by discoloured water. When on it, the passage between Rond island and the east end of Lagoendy is shut in; and when open, a vessel will be to the north-eastward of the reef. The highest point of Lagoendy in line with the west point of Nanga harbour, leads well to the south-westward.

ROND, SAKA, and SOENGAL ISLANDS.—Rond island, off the east end of Lagoendy, is about 2½ miles long, N.W. and S.E., and nearly a mile broad. Saka lies about one-third of a mile off the south-west point of Rond island; and Soengal about the same distance off the south-east point.

The depths in the channel, between Lagoendy and Rond island, are from 12 to 30 fathoms, hard ground, but a strong current runs there. Saka has also 20 or 30 fathoms close-to; but about half a mile S.E by S. from it, there is a rock which covers at high water; it is, however, always visible from its breakers. This passage cannot be recommended, nor that between Rond island and Soengal, for although the water is everywhere deep, the ground is foul and the current strong.

TIMS ISLAND, lying 3 miles eastward of Soengal, is small, low, consisting chiefly of red clay, and surrounded by a broad reef with heavy breakers; but the channels on either side of it into Lampong bay are quite clear.

KRAKATOA ISLAND, lying in the middle of Sunda strait, is about 5 miles in extent N.N.W. and S.S.E., and 3 miles broad. Its fine conical peak, rising boldly up to the height of 2,623 feet, may be seen at a considerable distance, and serves as a fairway mark for vessels entering the strait from the westward. A range of high land extends from the peak in a northerly direction for 1¼ miles, thence to the north-westward, and, gradually diminishing in height, disappears at the north-west point of the island; the outline of the range is marked by several prominences or peaks. The north coast of the island consists of rocky hills, without vegetation; the west and south coasts also consist of a steep and rocky shore, and on the eastern coast is the only level land.

Water.—There is a small spring of fresh water on the north-east side of Krakatoa, opposite the south end of Lang island, but it can only be approached by boats at high water, and ships should not depend upon

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watering there. A short distance to the southward there is a hot spring, in which the thermometer rose to 154°.*

Tides.—It is high water, full and change, at Krakatoa island, at 7h.; springs rise 4 feet, neaps scarcely perceptible. The tides, however, are much influenced by the prevailing monsoon.

Anchorage in North-west Monsoon.—A bank of soft mud extends from the east side of Krakatoa and Lang islands about 3 miles, with the peak bearing W.S.W. to S.W. by W., affording excellent shelter from westerly gales, by anchoring in from 20 to 23 fathoms about 1½ or 2½ miles off shore. The peak bearing S.W. by W. is the best berth; but vessels should not anchor with the north end of the island to the southward of West, or they will be exposed to a heavy sea rolling in from the westward between Krakatoa and Bezee island, during a westerly gale.*

VERLATEN, or Forsaken Island, 2 miles long, and half a mile broad, lies close off the north-west end of Krakatoa, separated from it by a narrow channel with numerous reefs, which make it dangerous for boats to pass through. A white rock 60 feet, and another rock 80 feet high, lie about three-quarters of a mile off its south-west end; and about a mile east of that end of the island, between it and Krakatoa, is a rock or islet, with a rock awash a short distance to the southward of it.

LANG ISLAND, about 1¾ miles long north and south, and about half a mile broad, is separated from the north-east side of Krakatoa by a channel barely 2 cables wide at its narrowest part. A reef stretches out from its north-west side nearly half a mile, and encircles its north and east sides at an average distance of half a mile, terminating off its south point. The west side of the island is bold and cliffy, with deep water close-to.†

POLISH HAT is a round islet, lying off the west side of Lang island, between it and Krakatoa; a reef projects about half a cable from its north-east side.

KRAKATOA CHANNEL between Krakatoa and Lang island was surveyed in 1854 by Mr. John Richards, Master, R.N., commanding H.M. surveying vessel *Saracen*, who discovered the shoal mentioned by Horsburgh as lying nearly a mile off the south end of Lang island, and which Lieutenant Rietveld, Netherlands Royal Navy, could not find. The shore of Krakatoa, forming the west side of the channel, is fringed with a reef extending about a cable from it, except at the point nearest Lang

* Horsburgh, Vol. I., pages 786, and 787.

† *See* Admiralty plan of Krakatoa channel, scale, $m = 1{\cdot}9$ inches on chart of Sunda strait, No. 2,056.

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island, where it projects about a quarter of a cable. There are depths of 34 and 30 fathoms in the channel, but the soundings are irregular, decreasing towards Polish Hat from the southward.

The above shoal lies a mile S.S.E. from the south point of Lang island, and about a quarter of a mile from the shore of Krakatoa. It extends about 1½ cables in the direction of the channel, and has a rock which is sometimes awash, and others just under water, upon it. The west extreme of Lang island in line with the east extreme of Krakatoa leads between this shoal and the reef extending off to the south-east point of Lang island, although it passes very close to both.

BEZEE or Tamarind island, bearing about N. by E., nearly 12 miles from Krakatoa peak, is nearly 3 miles in extent north and south, and 3¼ east and west. This island has also a high peak, named Sebezee, sharper than that of Krakatoa, and resembling a sugar-loaf, which rises abruptly to a height of 2,825 feet from the southern extremity of the island, and slopes gently down to the northward. A reef projects about a third of a mile from the west side of the island, some rocky points of which are visible above water; and off the north-east side there are three small islets named Huisman, Little Tamarind, and Gorts, all of which are surrounded by small reefs having banks between them; the islands and reefs extend a little over half a mile from the shore. Bezee island produces a certain quantity of pepper, and is inhabited by natives belonging to the villages in Lampong bay. The village is on the east side, opposite Little Tamarind island.

Anchorage.—All around this island there is good anchorage in 15 to 25 fathoms water; and at a mile from the north-east side there is an excellent roadstead, even in south-west gales, with 13 fathoms water.

BEZEE CHANNEL, between Krakatoa and Bezee, is 7 miles wide, and frequently used working out in the N.W. monsoon, in preference to the Great Channel, as the soundings are regular from 18 to 37 fathoms, and vessels may anchor when convenient.

Boom rock, lying nearly half a mile off the south point of Bezee island, is a few feet above water.

Hindostan rock is the only known danger in this passage.* According to Horsburgh a ship of that name struck upon it in 1791, and found on its summit, which was only 6 or 8 feet in diameter, 15 feet water, and 10 fathoms close-to. Krakatoa peak bears from it S. by W. ⅓ W.; the west extremity of Verlaten island S.W.; the east extreme of Lang island S. ¾ W.; Bezee island from N.E. ¼ N. to N.N.W. ¾ W.; the peak of Labocan island W. by N.; and the Zee-klip W. ½ N., well open to the southward of Labocan island.

* *See* Admiralty chart, Sunda strait, No. 2,056; scale, $m = 0{\cdot}3$ of an inch.

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Lieutenants Rietveld and Boom tried to discover this rock, but without success, though they found a shoal with 5¼ fathoms, least water, consisting of hard rock and coral, and having all around 6 to 13 fathoms, soft mud and clay, and at some distance 19 fathoms. From this shoal Krakatoa bore S. by W. ⅓ W.; west extremity of Verlaten island S.W.; south point of Zee-klip West, and the angle between the two extremes of Bezee island was 68° 30′. Some of these bearings agree exactly with the former, and it is more than probable that it is the same rock; but, if not, the true Hindostan rock must be very near to this shoal, possibly a little to the north-eastward or eastward of it.

Directions.—To avoid Hindostan rock, keep at least 2 miles from the south side of Bezee island. Horsburgh gives as the best mark for proceeding through this channel, never to bring Gap rock open to the southward of Labocan island, W. by N. Between Hindostan rock and Boom rock, there are 10, 16, and 20 fathoms water, rocky bottom; but between this latter rock and Bezee there are 8, 9, 13, 11, and 8 fathoms, with foul bottom. Lieutenant Rietveld saw here different patches of light-coloured water, owing apparently to an eddy current, and although they much resembled sunken rocks, all the casts of the lead indicated 16 to 19 fathoms.

ZEE-KLIP ROCKS (Sea rocks), bearing W. by S. ¼ S. 6 miles from Sebezee peak, consist of three pyramidal rocks near each other, and showing above water; the southernmost is the largest, and is often called Gap rock, on account of a cleft in it. They are visible at a considerable distance, bearing N. ½ E. and S. ½ W. from each other, and are connected under water by reefs, upon which the sea continually breaks. They are steep-to and inaccessible; and near them are 26 and 30 fathoms, mud and clay.

SEBOOKO ISLAND, 1,416 feet high, lies N.N.E. a mile from Bezee island, and consists mostly of craggy hills. Its extent is 3½ miles north and south, and about 3 miles east and west. The inhabitants are natives of Rajah Bassa, who cultivate some pepper plantations.

Close to the east side of Sebooko is Shelter or Beschutter islet, which is high on the east side, has a reef on its south side, and forms with Sebooko a small bay, with 15 to 19 fathoms water, affording good anchorage for proas. A coral rock, lying mid-channel between the east point of Sebooko and north point of Shelter islet, renders it dangerous to enter this little bay from the northward with westerly gales; but there is a good road for large vessels in 11 and 13 fathoms, one or 1½ miles from Sebooko, near the east side of Shelter islet.

Reefs project from the numerous points of Sebooko, and in some places they either show above water, or the sea breaks over them, but they do

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not seem to extend far off, except from the west point, from which a reef stretches off 1¾ miles; it is very steep-to, but not dangerous, because the westernmost rock on it rises to a considerable height out of the water, and has a slight resemblance to Zee-klip. This rock lies W.N.W. from the south point of Sebooko; S.W. by W. ½ W. from its north-west point; and N. ¼ E. from the west point of Bezee.

The Channel between Sebooko and Bezee islands is not quite a mile wide, with soundings from 19 to 23 fathoms, hard sandy bottom; the passage northward of Sebooko, between it and the Tiga islets, is 1½ or 2 miles wide, and has 20 to 34 fathoms.

HOG POINT, or Tanjong Toka, bearing S.E. by E. 7½ miles from Cocoa-nut point (page 178), is the south-eastern extreme of Sumatra, and between it and Fourth point on the Java coast, which bears S.E. 13 miles, is the narrowest part of Sunda strait. The point has a round hilly appearance, and is easily distinguished when approaching it from the eastward; but, coming from the westward, it has been mistaken for one of the Zutphen islands. A reef, having a rock above water near its western extremity, extends half a mile to the westward of Hog point. The soundings a mile to the southward of the point are from 40 to 60 fathoms.

ZUTPHEN ISLANDS are situated within 2½ miles of the Sumatra coast, north-eastward of Hog point. Four of them are large, and the remainder small, extending N.E. and S.W. about 4 miles, the whole being covered with trees. There are several shoals in the passage between them and the coast, amongst which there is said to be anchorage in some places. This passage is generally used by proas, and might be taken by large vessels with a commanding breeze, there being sufficient depth of water, but great caution is recommended. The islands are steep-to on their south side, having 40 and 50 fathoms water near them. The following description is from the surveys of Lieutenant D. H. Kolff, in 1833, and Lieutenant Rietveld, Netherlands Royal Navy, in 1841:—

KANDANG the south-westernmost of Zutphen islands is about a mile long N.E. and S.W., and half a mile broad, of considerable height, and covered with large trees. Off its north-west side are two coral rocks, visible above water, and steep-to on their western sides. Near these rocks on the north-west side of Kandang, there is a small bay that affords a safe anchorage to proas in 11 or 12 fathoms water, close in shore, and even large vessels would find safety there; it is however frequented by pirates.

HIGH and HOUT ISLANDS, lying to the eastward of Kandang, are of considerable height, rocky and covered with trees. They are about half the size of Kandang, the three islands being separated by narrow channels. Between Kandang and High island is a small islet, with some cocoa-nut trees upon it.

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A reef of rocks lies 2 cables from the north-east, east, and south-east sides of Hout island, with 10 or 12 fathoms in the narrow passage between it and the island. There are 40 to 50 fathoms a short distance to the eastward and south-eastward of Kandang, High, and Hout islands.

COCOA-NUT ISLAND, lying westward of Kandang, is small, low, and surrounded by a reef, which is steep-to.

BROTHERS, lying to the northward of High and Hout islands, are two small, low, sandy islands, covered with small wood, and surrounded by a narrow but steep reef, with 15 and 18 fathoms water close-to.

With a leading wind, a vessel coming from the eastward may pass between Brothers islands and Hout island, as this channel has 18 and 20 fathoms water; but its narrowness and the strong currents, sometimes at the rate of 2 and 3 miles an hour, render it dangerous, and the more so as the depths increase speedily to 30 and 40 fathoms. Care should also be taken to avoid the reef projecting from the north-east point of Hout, upon which the *Bombay* grounded in February 1815.

REMOA ISLAND, the northernmost and largest of Zutphen islands is also the highest, being elevated 300 to 400 feet above the sea, the south end being the higher. To the north-west there is a low neck of land, at 400 yards from which the ground begins to rise. Part of the low neck is a sandy beach, which affords a good place for boats, it being very difficult to land elsewhere.

BOOMPJES REEF, situated on the south side of Remoa, is partly above water, with a narrow channel between it and the island; on the reef is some small brushwood; from its south point the north-east point of Thwart-way bears S.E. ½ E.

FATAL ISLET and REEF.—Close to the north-east point of Remoa is a high rocky islet, named Fatal, from which a reef projects to the north and north-west, about half a mile, having on it a coral rock, which dries at low water, with depths of 11 and 12 fathoms close-to, so that the lead gives but little warning. From the northern point of this reef the north point of Fatal islet is in line with Button island; and from its western edge the west point of Remoa is in line with the west point of Kandang island.

TOEMPAL ISLAND, lying westward of Remoa, is a small, low, woody island, surrounded by a reef, which is steep-to.

CORAL ROCKS.—South of Toempal and nearly in mid-channel, are two steep coral rocks, with 2 or 3 feet water upon them at ordinary tides, and sometimes dry. They lie with Boompjes reef and the north-east point of Thwart-way island in line bearing S.E. ½ E. Close to their east side are 23 fathoms water, which shoals gradually towards Remoa, and westward and southward of these rocks there are 12 and 16 fathoms. A

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little farther south lies a small but steep coral rock, sometimes dry at low water, with Boompjes reef in line with the north point of Button island bearing E. ½ S., and the southernmost point of Sumatra in line with the east point of Cocoa-nut island.

Caution.—On account of the rapid currents experienced at times near Zutphen islands, in the westerly monsoon, vessels ought not to approach their south and south-east parts nearer than 1½ or 1¼ miles, particularly in passing Hout island, where the current runs with great velocity, sweeping to the S.W. and W.S.W. round Hog point. In February 1815, the China fleet in passing to the eastward of Zutphen islands, found a current sweeping them to the westward at the rate of 4½ miles an hour, and several of the ships were carried close to danger. The *Bombay*, after dropping two anchors, was driven on the reef off the north-east part of Hout island; the *Castle Huntley* succeeded in bringing up with two anchors in 14 fathoms, rocky ground, about a cable from the *Bombay* aground.

Anchorages.—Lieutenant Prins, in 1844, discovered an excellent anchorage for several large vessels between Hog point and Zutphen islands. He says, if in either of the monsoons a vessel cannot work through, or is detained by calms or currents, she may bring Kandang island to bear N.E., and Sindoe island North, and to the westward of that line she may choose her berth in from 30 to 5 fathoms, sand; and thence the land wind will enable her on the following morning to pursue her voyage. Moreover, just to the westward of Sindoe there is a small river, with good water, near Pegantoengan village.

On the Sumatra coast, abreast the north point of Remoa, is situated Steile point, bluff and steep, to the northward of which there is a reef, with rocky points above water; while still farther north the coast is fronted with a mud-bank, which makes landing in boats difficult. Lieutenant Kloff anchored there with the schooner under his command in 7 fathoms, soft bottom, with Steile point bearing S.W., Toempal island, S.S.W., and the north-west flat or point of Remoa, S. ½ E.; he found there some huts near a fresh-water spring, but in general the natives are not to be trusted; and he remarked that some piratical looking proas made a hasty retreat at his appearance.

This officer also anchored, in 12 fathoms, with Toempal island bearing N.N.E.; the north-west point of Remoa, N.E. ½ E.; the steep point of Sumatra N. ½ W.; the south-west point of Remoa, S. ½ E.; and the little rocky island, close to the shore of Sumatra, where a fresh-water spring runs into the sea, about West.

Another anchorage is between Cocoa-nut island and Brothers islands, with the west point of High island, bearing South, distant half a mile, in 15 fathoms of water.

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Directions.—The passage inside Zutphen islands, cannot be recommended, as it has not been thoroughly surveyed. The following directions are from the Seaman's Guide round Java:—

Vessels from the northward intending to pass between Sumatra and Remoa, should steer in shore from that island, and in order to clear the reef off its north and north-west points, keep the west point of Kandang just open of the west point of Remoa, till it appears between the latter and Toempal; then steer close in for Toempal—which is very steep here—and close to the coral rocks which lie in mid-channel southward of that island. Having passed Remoa, steer in close to Cocoa-nut island, by which a vessel may run freely from the visible reefs, north-westward of Kandang, and find soundings of 16 and 20 fathoms, which will increase southward of Cocoa-nut island to 30, and eastward of Hog point to 50 and 60 fathoms, no bottom.

The Channel between Thwart-way and Zutphen islands is 4 miles wide, with two dangers, viz.: Stroom rocks off Thwart-way, and Winsor rock off Button island. Owing to the great depth of water in it, 40 to 50 fathoms, it is not so convenient as the channel between Thwart-way and Java, where the depths being only 20 to 30 fathoms, greater facility is afforded for anchoring in calms. Horsburgh says that the channel between Thwart-way and Sumatra is much frequented in the westerly monsoon, by vessels bound to the westward, being shorter although more contracted than the other channel between Thwart-way and Java. The former may be adopted with a steady wind, for in such case, with the westerly current, a vessel will get speedily through; but in light baffling winds, she is liable to be drifted about by strong tides or currents near Stroom rocks, where there is no anchorage, except in deep water from 40 to 60 fathoms.

STROOM ROCKS, lying N.N.W. ½ W. 1½ miles distant from the west point of Thwart-way, are a group of three or four rocks near each other, with some of their tops visible at high water, only a short distance, during fine weather, but at other times they may be seen at a considerable distance by the breakers on the reef which connects them under water. They are steep-to, having 40 and 50 fathoms near them.

The currents which meet about here from the north and east are very strong, and with the opposite wind, there is, near these rocks, such a boiling and edding of the water all around, that it almost appears as if they are connected to Thwart-way, the light-coloured patches between them appearing like rocks under water.

WINSOR ROCK, on which the American ship *Claudius*, Captain Winsor, struck in May 1837, was examined by Lieutenant B. G. Escher, Netherlands Royal Navy. From the rock the middle of Button island bears E. by S. ¾ S. distant 1½ miles; the north-east point of Thwart-way,

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S.S.W. ½ W.; its north-west point, S.W. ¼ S.; and the south point of the southernmost Zutphen island is just in line with the northernmost visible point of Bezee island. The least water on Winsor rock is 16 feet; the depths increasing suddenly in every direction. Other rocks were seen in the eddy on the lee side of the rock.

The Coast of Sumatra from Zutphen islands trends N.N.E. ½ E. for a distance of 3 miles to Gantongan point, thence in a northerly direction 154 miles to Lucipara point. This part of the coast is fronted by rocks.

PULO LOGOK is a small but high island, lying one mile north of Gantongan point, and 4 miles N. by E. from Zutphen islands; the coast near it is rocky and steep. Lieutenant Kolff found there 15 and 20 fathoms, hard sand; but farther to the southward towards the steep point near Zutphen islands, a mud-bank projects from the shore; the lead is a sure guide, for the bottom in 9 and 10 fathoms is hard, while in 7 and 6 fathoms it becomes soft.

SISTERS are three small islands lying about N. by E. 3 miles from Pulo Logok. Nearly a mile in a south-easterly direction from them is a small reef with only 2 fathoms water, with North island bearing N. ¼ E., and the middle of Sisters islands W.N.W. Another shoal lies with the east point of North island N. ½ E., and the outermost Sister N.W. ¼ W. to N.W. by W. ¾ W. It is, therefore, advisable to give Sisters islands a berth of 2 miles, where irregular soundings of 16, 12, and 8 fathoms will be found.

NORTH ISLAND, lying N.N.E., 3 miles from Sisters, is small, bushy, and a full mile distant from the coast of Sumatra. There is a small islet, named Sina, at its southern extremity; and extending to the south-east of it is a shoal of 3½ fathoms water. The island therefore requires a berth of at least 1½ miles; its north and south-west sides are steep-to.

Lieutenant R. Liddle, R.N.R., 1866, remarks that a spit extends a third of a cable from the north-west end of North island, and is steep-to, having a depth of 18 fathoms within the distance of a few feet. Between this island and the main land (Sumatra) there is a channel nearly a mile wide with 18 to 20 fathoms water, and 3 fathoms, blue mud, within a quarter of a mile of the mangrove trees; the bottom near the main appeared to be all soft, and that near the island sand and broken coral.

The small islet (Sina) which lies little more than 1¼ cables southward of North island, is covered with bushes, and has a coral bank extending 40 yards to the northward of it, there is also a coral bank extending 60 yards to the southward of North island, thus forming a channel about three-quarters of a cable wide, with depths of 8 to 9 fathoms in the middle; the coral banks on each side of the channel are steep-to, and being nearly awash can be distinctly seen.

Anchorage.—Between North, and Sisters islands the coast recedes a little, and is edged by a mud-bank; so that 2 miles from the shore

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will be found good soft ground for anchoring, in 8 to 12 fathoms, with North island bearing N. by E. Small vessels will find good anchorage between Sisters islands and the main, in 2 or 3 fathoms water. Abreast of Sisters islands there is a fresh-water spring, but Lieutenant Kolff found its contents detrimental to the health of his crew, although it was clear and free from any unpleasant taste.

WORKING through SUNDA STRAIT during the NORTH-WEST MONSOON.—The best route is between Zutphen islands and Stroom rock (page 187), giving Zutphen islands a berth of at least $1\frac{1}{4}$ or $1\frac{1}{2}$ miles on their eastern side, thence work up by short tacks along the coast of Sumatra to Hog point. In working through the passage between Sebooko and Sumatra, pass either north or south of Tiga islets (page 177), as the strong currents and hard squalls may allow, thence to the northward of Tims island, and between it and Soengal, or through Lagoendy strait. In this manner a vessel will make a quick passage through the strait, if the wind be not too variable, besides having the advantage of anchoring on the east side of Sebooko island, or in Lampong bay, if the currents or winds be too strong.*

* There are, however, on record many instances of vessels having worked out of the strait along the coast of Java, during the western monsoon, with more ease and celerity than could have been effected by stretching into Lampong bay, in consequence of the westerly current having at those times developed its chief strength along the former side of the strait.

The following extract from a ship's log book will show something of the action of this current:—

1846.					
		At anchor 6 miles W. of Tyringin (page 165).			
March 1.	4 P.M.	Current	S. by E.	2 knots	Moderate breezes from W.S.W. to W.N.W., but freshening.
	8 „	„	S.	2 „	
„ 2.	4 A.M.	„	S.S.E.	3 „	
	8 „	„	W.	4 „	
	At anchor between Button island and St. Nicholas point.				
March 2.	8 P.M.	Current	S.	2 knots	Fresh breeze from N.W.
„ 3.	4 A.M.	„	S.W.	3 „	
	6 „	„	S.W.	5 „	
	8 „	„	S.W.	3 „	
	12 „	„	S.W.	2 „	N.N.E. moderate.
	2 P.M.	„	Slack.		Light westerly breeze.
	4 „	„	S.E.	2 „	
	8 „	„	S.E.	2 „	
„ 4.	1 A.M.	„	S.E.	2 „	Freshening.
	2 „	„	S.	2 „	Gentle N.W. breezes.
	4 „	„	S.S.W.	2 „	
	6 „	„	S.W.	4 „	
	8 „	„	S.W.	5 „	

It has been generally supposed that the currents at both ends of Java are regulated by the monsoons; but according to Lieutenant H. M. Jansen, Netherlands Royal Navy, who has had great experience in the Indian archipelago, it appears that most part of the year a westerly current sets out of Sunda strait. It is much to be wished that this important element in Indian navigation should no longer be left a matter of doubtful opinion.

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CHAPTER IV.

SUNDA STRAIT TO BANKA STRAIT.

VARIATION 0° 50′ East in 1878.

MONSOONS.—In the Java sea the south-east monsoon commences in April, gradually increases till May, and ends in October, when the winds become variable. The north-west monsoon commences early in November, is at its height in December, and continues until the end of March, when it is succeeded by light winds, squalls, and rain. In Carimata, Gaspar, and Banka straits the south-east and north-west monsoons prevail as in the Java sea. But the times of the changes of these monsoons and their direction are irregular, and the south-east monsoon is subject to calms.

CURRENTS in the Java sea are for the most part influenced by the prevailing monsoon, and are generally stronger during the north-west than in the south-east monsoon. They incline to the northward or southward, according to the influence of the currents of Sunda, Banka, and Gaspar straits; for, during the north-west monsoon they run to the eastward, or more southerly, according to the set of those which come from the straits; and in the south-east monsoon they run to the westward or more northerly from a similar cause. Through a succession of tides which were observed, chiefly during the south-east monsoon, it was found that those which followed the direction of the monsoon were stronger and of longer duration, so that a daily allowance from 8 to 12 miles may be made in the south-east monsoon, and from 20 to 24 miles in the north-west monsoon.

The EAST COAST of SUMATRA, between Sunda and Banka straits, has never been regularly surveyed. The following description is taken from Horsburgh, the Java guide, and from the Admiralty chart of the Java sea, which has been compiled from the most recent Dutch authorities.*

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* *See* Admiralty charts:—Eastern Archipelago, western portion, No. 941*a*; scale, $m = 2{\cdot}75$ inches; Sunda strait, No. 2056; scale, $m = 0{\cdot}3$ of an inch; and Banka, and Gaspar straits, No. 2,149; scale, $m = 0{\cdot}14$ of an inch.

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The coast is generally low, and covered with wood to the water's edge, and does not therefore present much variation in aspect. It is fronted by some very extensive shoal banks, which in some places project 14 or 15 miles from the shore, but their exact boundaries are uncertain.

From abreast North island (page 188), the coast trends, with a slight curve inland, nearly North for 16 miles, to the entrance of a small river named Nibong. Two other rivers, Sikampong and Nielei, also appear on the chart of this part of the coast. From Nibong river the coast trends North nearly 17 miles to Pennat river, and thence it assumes for a distance of 15 miles a rather irregular outline, in a general direction about N. by E. ¾ E. to Tanjong Supong.

Mount Imbong, in lat. 5° 21½′ S., generally described as, and sometimes named, Knob hill, is the most prominent hill on the coast near Two Brothers islands, but the latter name tends to mislead. It is of low elevation, of very gradual ascent, and covered with trees. There is a hill to the north-west of it of Hummock form.*

SHAHBUNDAR BANK and SHOALS.—Abreast of mount Imbong and of Tanjong Supong, the bank fronting the Sumatra shore projects about a mile only; but about midway between those points it stretches 10 miles in the direction of Two Brothers islands; the channel between the bank and those islands being about 6 or 7 miles wide. Upon the outer edge of the bank are several shoal patches, upon one of which the Dutch ship *Shahbundar* narrowly escaped destruction. In 1749 the *Sandwich*, an English ship, grounded in 17 feet, with the northernmost land of Sumatra, that was visible, bearing N. by W., and the northern Two Brothers island, E.N.E.-easterly.

As the depths decrease gradually towards this bank, the lead, if attended to, will indicate its proximity. A vessel passing between it and Two Brothers islands should not keep farther than 3 or 4 miles from the latter, nor shoal to less than 9 fathoms towards the coast, which in daylight may be kept in sight if the weather be clear.

The Coast.—From Tanjong Supong to a point 1½ miles north-eastward of Saputi river, the bearing is N. by E. a little easterly, and the distance 13 miles, the coast between forming a bight 3¼ miles deep. Thence the coast trends N. ¼ W. 11 miles, and then a little more westerly for 11 miles farther, to the entrance of Toelang river. The bank, fronting the coast between Tanjong Supong and the entrance of Saputi river, extends a little more than half a mile from the shore.

Saputi river, the mouth of which is in 4° 43′ S., may be approached as near as 3 or 2 miles. H.N.M. steam vessel *Vesuvius* anchored, in

* Commander Bullock, R.N., 1865.

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April 1846, in 3½ fathoms, with the mouth of the river bearing W.N.W., Tanjong Supong S. by W., and the northernmost visible land N. by W.

TOELANG BANK, situated to the northward of Saputi river, is an extensive hard sand-bank projecting 14 miles from the shore; but its south side, bending in to the northward, forms a kind of bay. The *Vesuvius* searched in vain for a passage inside this bank, and grounded in the attempt. After getting off, she steered S. by E. till the mouth of Saputi river bore W. by S., and then steering East, she had 5 to 7 fathoms upon a hard ground. By edging in to the north-eastward, she at once shoaled to 3 fathoms, but by hauling out South the depth increased rapidly to 9 fathoms, soft ground, having the river about 4 miles W. by N. According to the reports of the natives, there is, however, a kind of passage between the bank and Toelang river.

TOELANG RIVER.—The mouth of this river, in 4° 21′ S., may be closely approached. Near its entrance there is a small village; and three days' journey up the river, according to the natives, is a town called Mangala, where the Rajah resides. The *Vesuvius* anchored in 4 fathoms, 3 miles N.E. by N. from its mouth, and despatched some armed boats up the river in search of pirates, who sometimes hide themselves there. The boats crossed a bar in the mouth, having only one fathom depth of water, but inside of it, and as far up as 14 or 15 miles, they had 3 and 4 fathoms. A mile north of the mouth they observed the mouth of another river, and a third one in lat. 4° 6′ S.

The Coast from Toelang river to Tree island, 37 miles to the North, curves inland 3 or 4 miles, and about the middle of it is the mouth of the Masudyi river. Tree island is in about lat 3° 41′ S., and close to a point of land; the passage between being dry at low water. Thence the coast curves round to a point N. by E. distant 17 miles; from which Lucipara point, at the entrance of Banka strait, bears about N.E. by N., distant 15 miles, the coast between forming a bight 3 miles deep.

Shore Bank.—Between Toelang and Masudyi rivers the bank extends from the shore about 3 miles only, but a little northward of the latter it again projects to the distance of 14 or 15 miles; thence it edges away towards the coast in a N. by W. direction to about 7 miles northward of Tree island, where it approaches the shore within 3 miles; it then extends N.E. for 16 or 17 miles, where its edge is 11 miles distant from the land; here it recedes again towards the coast, and takes a northerly direction to Lucipara point, from which it projects but 2 miles.

Dangerous Patches.—On this bank, between Masudyi river and Lucipara point, are many dangerous, and occasionally dry, patches. H.N.M. ship-of-the-line *Tromp*, in August 1819, grounded in 3¾ fathoms, hard sand, S. ¾ W. 9 miles from Lucipara point. At high water she got

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off, and steered E.N.E. till in 5 fathoms, and then N.E. in 4 and 4½ fathoms till she sighted Lucipara island.

ISLANDS AND DANGERS.

The dangers heretofore supposed to exist between Thousand islands and the Sumatra shore, known as Dolphin, Antelope, Banterer, and Paulowna,* were searched for in vain by Commander C. Bullock in H.M.S. *Serpent* (1865), and have been expunged from the chart. The position of Lynn bank, as well as that of Coventry reef, both of which uncover at low water, were accurately determined. The positions of several other dangers in this route were also rectified, but as no complete survey has been made, vessels navigating this locality are recommended to proceed with caution.

JASON ROCK, with 14 feet water, the existence of which is doubtful, is said to lie N.W. by W. ½ W. 5½ miles from West island; and S.W. ¾ S. 15 miles from North Watcher island.†

WEST ISLAND, or Pulo Peblekan, in lat. 5° 28½′ S., long. 106° 23′ E. is a quarter of a mile in length, and low, but the trees on it may be seen 13 or 14 miles from a vessel's deck. It is steep-to on all sides at half a cable distant, except round its north-east sandy point, off which a coral reef extends a quarter of a mile.

COVENTRY REEF, of coral, dries at low water and was seen always to break in the calmest weather. The shoalest part is S.S.W. one mile from West island, and is about a cable in extent, but it appeared to shelve off to the south-west for a quarter of a mile, which would agree with

* A shoal, about three quarters of a cable in extent, was stated to have been clearly seen from the topsail yard of the Dutch barque *Anna Paulowna*, in about lat, 5° 39′ S. long. 106° 26′ E., Pulo Benting of the Thousand islands bearing E. ½ N., and the west point of Great Tidong island S. by E. ½ E. 9 miles. This position was examined by the *Serpent*, but no shoal was discovered, although evidences of rocky bottom were obtained She also searched for it without success in another reported position, W. ½ S. 2 or 3 miles from West island, and the conclusion arrived at was that the Coventry reef had been seen by the *Paulowna*.

† A ship named the *Jason* is said to have struck on a rock lying W.N.W. 5 miles from West island, and 18 miles S.W. by S. from the North Watcher; but the boat of the *Warren Hastings* could not find it on these bearings.—Horsburgh.

Three and a half days were spent by the *Serpent* and her boats in searching for this danger. Indications of rock were certainly found, angular pieces of red sandstone or clean sand being brought up on the lead occasionally, when all around showed green mud and coral sand; still this was found in other places. No sign of shoal water was observed from the masthead. Vessels therefore may pass this doubtful danger in fine weather in the daytime without apprehension, taking the precaution of a good look out.

It may be here noticed that this rock has never been seen or reported since 1712, a period of 153 years. Nothing can be more vague than its alleged bearing from the North Watcher, or even from West island. On some old charts shoals have been placed on this same bearing of the North Watcher at 6 and 12 miles from it.

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the account given at the time of its discovery by the *Caroline Coventry* in 1858. Doea island kept open west of West island will lead to the westward; and Rangat island in line with North island will lead to the eastward of Coventry reef.

CHRISTIAN ROCK, on which the British ship *Christian* McCausland was wrecked in 1877, is said to lie W.S.W., about 1¾ miles from Dyogon island, and E. by S. ½ S., 5½ miles from West island; there is a depth of 16 feet on the rock which is steep-to, having 10 fathoms within half a cable.

RANGAT ISLAND, situated about 3 miles E.N.E from West island, is a small island surrounded by a sandy beach, having a reef on which the sea breaks heavily, extending about 2 cables from its north and north-east sides.

Reef.—About 3¼ miles E. ½ N. from West island, lies a reef composed of coral and stone, extending about one cable, north and south, and 2¾ cables, east and west, with 4 feet water on the shoalest part, and 4 to 5 fathoms around it; from the reef the extremes of Rangat island bear N.W. ½ N., and N.W. by N.

EDELING SHOALS consist of two coral patches east and west of each other and half a mile apart. On the eastern shoal there may be as little as 3 fathoms at low water; on the western, 4½ fathoms. They lie directly between Doea, and Rangat islands; from the latter they bear N.E. ¾ N., and N.N.E. ¼ E., 1¾ and 1½ miles respectively. Two other patches of 9 fathoms were found, and so many indications of sandstone bottom, that vessels should approach this vicinity with caution.

It is recommended that vessels of heavy draft should not pass eastward of a line joining Doea, and West islands.

NORTH, and DOEA ISLANDS, the two north-westernmost of Thousand islands, stand out conspicuously from the group. They lie respectively N.E. by E. ¼ E. 6¾ miles, and N.E. ½ E. 6 miles from West island. In the channel one mile wide between them, Mr. Ross, proprietor of the Keeling islands, reports a detached reef, which was seen breaking from the mast head of the *Serpent*. It lies nearer to North island.

HELENS ROCK.—The barque *Helens*, 1876, struck on a rock near the north-west part of Thousand islands. The lead was immediately hove and 5½ fathoms obtained from the starboard gangway, deepening suddenly to 10 and 15 fathoms. The following bearings were taken, namely, North Watcher, N. by E. ¾ E.; Rangat, S.E. by S.; and Peblakan S. ¼ E.*

* Nautical Magazine, February 1877, page 174.

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NORTH WATCHER, the summit of which is in lat. 5° 12½′ S., long. 106° 27′ E., is a narrow island half a mile in length, the north-east part covered with high trees, the south-west part with low trees, visible in clear weather 18 or 20 miles. A coral reef,* with only 6 feet water in some places, stretches about half a mile round the south end of the island, with a rock in one place above water.

Light.—On North Watcher island stands a white lighthouse, exhibiting at an elevation of 159 feet above high water, a white light, which *revolves* once *every minute*, and should be seen in clear weather from a distance of 20 miles.

Wrecks.—The wreck of the *War Eagle* lies S.W. by W. 5 miles from the south-west point of North Watcher island. She is in 12 fathoms, mud bottom, her topmast heads showing above water. A blue flag has been placed on the main topgallant mast-head. She is alleged to have struck on a reef 2 miles to the north-west of North Watcher, for which a Netherlands vessel was sent to search.

The wreck of the steam vessel *Willim Kroonprins der Nederlanden* lies sunk in 13 fathoms, with North Watcher bearing S. ½ E., distant 13 miles, the masts showing above water (1876).

OMEGA ROCK, on which the American ship *Omega* struck in 1835,* lies about E. by S., distant three-quarters of a mile from North Watcher island. According to her captain it is composed of coral, about 150 to 200 yards in extent, N.N.E. and S.S.W., and about 60 or 70 yards broad, is steep-to, and has not more than 9 to 12 feet on the shoalest parts. It should be given a wide berth by a vessel passing eastward of North Watcher, from which it is separated by a narrow channel with 11 and 12 fathoms water.

BROUWERS SHOAL† has been determined by the Netherland survey to be in lat. 5° 17′ 30″ S., long. 107° 0′ 20″ E., about 8 miles north-eastward of its position on the old charts.

ETNA BANK, on which the sea breaks, is in lat. 5° 17′ 30″ S., long. 106° 54′ 45″ E.

MOLENWERF BANK, the existence of which is doubtful, is said to lie in lat. 5° 14′ 15″ S., long. 106° 55′ E.

ARNEMUIDEN ROCK, above water, lies East of North Watcher island, and is in lat. 5° 12′ 30″ S., long. 106° 42′ E.

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* Horsburgh, Vol. II., page 3.

† The information about Brouwers shoal and Arnemuiden rock was supplied from the Hydrographic Bureau at Batavia.

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TWO BROTHERS are low islands, which together extend one mile in a N. ¼ E. direction. The northern island is small and round, with high trees; the southern island is 4 cables long, and two of its trees are very high and conspicuous, and may be seen in clear weather 20 to 23 miles off. Broad coral reefs surround the southern island: round the north island they are narrower. There is a passage between the islands 2 cables wide, having 7 to 5 fathoms over an apparently regular bottom. To the east of the islands is good anchorage in 9 to 10 fathoms.

The south point of the South Two Brother island is in lat. 5° 10′ 25″ S., long. 106° 6′ E.

DOUBTFUL DANGERS.—The dangers said to lie in the track of vessels sailing direct between Sunda strait and North Watcher island were searched for by the *Serpent* during several days. The hand and deep sea leads were constantly going, and a good look-out kept from the mast-head.

A short time was also devoted to the Antelope, and other shoals reported to lie South and S.S.W. of Two Brothers islands, but nothing was seen of them. A 9-fathoms bank of fine speckled sand was found 2½ to 3¼ miles S. ½ E. of Two Brothers islands. This bank, which showed of a pale green colour, visible 2 miles, would prove at times a convenient anchorage; Two Brothers islands just touching lead over the shoalest part. There are not more than 10 fathoms between this and Two Brothers islands.

Dolphin rock, on which the ship *Dolphin* was said to have been aground* was searched for by the *Serpent* during part of two days. It was described as nearly even with the water's edge, and to lie about 6 miles S.S.E. from the south end of Two Brothers islands, but it does not appear ever to have been seen by any other vessel. The distance from Two Brothers islands is precisely that of Lynn bank, and a change in the bearing from S.S.E. to E.S.E. (such an error being not an uncommon one), would make it Lynn bank. If it were not for some indication of sandstone bottom, no credibility need be attached to the statement which records its existence.

SWALLOW BANK.—In April 1866 Mr. Wilds, Master Commanding H.M. surveying vessel *Swallow*, succeeded in finding the bank marked on former charts at about 8 miles S.S.W. of Two Brothers islands.† Its positions is in lat. 5° 17′ 40″ S., long. 106° 3′ 50″ E., the southern Two Brothers island bearing N. 17° E. (true), distant 7¾ miles. There are only 22 feet water on the bank, and vessels of heavy draught should be careful to give it a wide berth, as there was neither ripple, break, or swell to indicate its position. At half a mile S. by W. ½ W. from the bank

* Horsburgh, Vol. II., page 5.

† A Dutch ship is reported to have been totally wrecked upon Swallow bank. Mercantile Marine Magazine, May 1855.

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soundings in 5 fathoms were obtained on a small patch of sand and shells, with 9 fathoms between it and the bank. The depths around the bank were 9 to 10 fathoms, sand.

LYNN BANK is composed of coral, a cable in extent, N.N.E. and S.S.W., and half a cable in breadth, having general depths of 2 to 4 feet, with some rocks that dry at low water; from the centre of the bank the north extreme of the northern Two Brothers island bears N. 68° W. 6½ miles, and the south extreme of the southern Two Brothers island, N. 77° W. There are 8 fathoms close to the bank, deepening to 13 and 14 fathoms at a cable's distance.

The extremes of the islands subtend an angle of 9 degrees; if therefore they be made, whilst passing on (or within a point or more of) the above bearings, to subtend an angle of 8°, a vessel will pass about a mile outside the bank; and if an angle of 10°, half a mile inside it. In calm weather the shoal from its dark colour is extremely difficult to see until close upon it; the above method as a safeguard will then be invaluable and may be used with confidence. A sharp look out should always be kept as the shoal may only be detected by a slight ripple. At night it is recommended to close Two Brothers islands and pass them at one to 2 miles.

BROUWERS REEFS are two dangerous coral shoals, separated about half a mile from each other, with a dry patch of sand and coral upon each. They are together a mile in extent, and a quarter of a mile in breadth, with depths of 4¾ to 15 fathoms in the swatch between them. Hard ground stretches out from their north and south ends; at a short distance to the eastward and westward the bottom is soft, and the depths 1½ miles eastward are generally 14½ and 15 fathoms, regular soundings.

The *Serpent* anchored near the north-east part of these reefs. No astronomical observations were obtained, but the position of the North reef by careful magnetic bearings was made to be in lat. 5° 4¾′ S., long. 106° 15′ E., the northern Two Brothers island bearing S. 60° W., distant 10 miles, and North Watcher island S. 58° E., 15 miles. This is rather nearer Two Brothers islands than the commonly received position.

A vessel passing eastward of Brouwers and Lynn reefs, should keep nearer North Watcher island, than Two Brothers islands. The mountain seen to the southward is mount Karang (6,014 feet high), south of Anger, and in lat. 6° 15′ S., but from the above reef and islands the round hill over St. Nicholas point is more often visible and is a good landmark. The latter is named mount Gedeh, and its height is 2,100 feet.

CLIFTON SHOAL, on which the ship *Clifton*, of Bristol, is reported to have grounded, in November 1850, has a depth of 18 feet on it, with 24 and 27 feet to seaward, and is situated about 9 miles to the eastward of Tanjong Supong, in lat. 4° 56′ S., long. 106° 3′ E.

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COMARA SHOAL, the existence of which is doubtful, is said to lie about 27 miles to the north-westward of North Watcher island, and 21 miles from the coast of Sumatra, in lat. 4° 49′ S., long. 106° 14′ E.

OCEAN MAIL SHOAL, the position of which is doubtful, is said to lie about 33 miles to the eastward of Toelang river, in lat. 4° 18′ S., long. 106° 26′ E., with a depth of 18 feet on it, and 7 to 8 fathoms all round.

A PATCH of hard ground, about 2 miles in extent, having but 4½ fathoms least water over it, appears on the chart in lat. 4° 11′ S., long. 106° 8′ E. The soundings around it are irregular, 6 to 11 fathoms on the east side, and 6 to 9 on the west.

AREND BANK, in lat. 3° 45′ S., long. 106° 15½′ E., is 2 miles in length, and the same in breadth, consisting of fine gray sand and broken shells. It has 4½ to 6 fathoms water over it, and is surrounded by a depth of 6 fathoms, which rapidly increases, over a soft bottom.

BOREAS BANK lies E. ½ N. about 7 miles distant from Arend bank, in lat. 3° 44′ S., long. 106° 27′ E. It is also composed of fine gray sand; and the least water upon it is 5 fathoms. Around it the depth increases rapidly to 10 and 13 fathoms, except on the north-west side, where the soundings are regular for some time with 5 and 6 fathoms. Between Arend, and Boreas banks there are irregular depths of 8 to 14 fathoms.

Caution.—Vessels in this neighbourhood unexpectedly shoaling their water at night ought to be very careful, for many that considered themselves to be upon these banks, were in fact upon those off the coast of Sumatra, near Tree island, and consequently were in great danger. These two banks consist of fine gray sand, while those near Tree island are of coarse sand with gravel.

CITY OF CARLISLE BANK.—A ship of this name, in 1861, reported a patch of 16 feet to exist in lat. 3° 46′ S., long. 106° 20′ E., or S.W. by W. ½ W. 3½ miles from Boreas bank. Mr. Wilds, commanding H.M. surveying vessel *Swallow*, searched for it the following year but did not succeed in finding it.

Soundings.—The depths in that part of the sea which lies between North Watcher island, Two Brothers islands, and Lucipara island, are, except the 4½ and 5 fathoms on Arend and Boreas banks, tolerably regular from 10 to 16 fathoms; but nearer to Sumatra, about 22 or 24 miles from the coast, the become irregular, changing often, and suddenly, from 10 to 5 and 6 fathoms. Towards Lucipara island in the usual track towards Banka strait, the water shoals gradually to 6 and 4½ fathoms.*

* A wreck formerly lying about 14 miles to the southward of Lucipara, the mast-heads of which were visible above water in 1845, is said to have disappeared.

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Directions from Sunda Strait to Banka Strait.—Having passed through Sunda strait, and bound to Banka strait, it is usual to steer a direct course for Two Brothers islands. With a working wind, it will be prudent to keep within a moderate distance of the Sumatra coast; 11 or 12 fathoms is a good depth. A good mark in daylight is, when standing in-shore, to tack when North island is just on with the highest Zutphen island; the soundings will then be generally 7 or 8 fathoms, and a large vessel should not risk a less depth when working between North island and Swallow bank (page 196), which she will pass eastward of, if the southern Two Brothers island be not brought eastward of N. by E.

Although the space between Thousand islands and Two Brothers islands can be navigated with more confidence since its partial examination by Commander Bullock in H.M.S. *Serpent* in 1865 (see page 193), yet, as no complete survey has been made, the mariner is recommended to proceed with caution. Two Brothers islands may be passed at a prudent distance on either side. On passing to the eastward, take care to avoid Lynn bank and Brouwers reefs (page 197); and when passing between the islands and Shahbundar banks, a vessel should not keep farther from the islands than 3 miles, and not nearer the coast of Sumatra than the depth of 9 fathoms.

Having passed Two Brothers islands steer to the northward towards Lucipara island, keeping Two Brothers islands to the westward of South, to avoid Clifton shoal (page 197), and endeavouring to keep in soundings from 9 to 12 fathoms, as a direct course cannot be depended upon, on account of irregular currents or tides setting out from the rivers. Neither can the soundings in this track be implicitly trusted to, being irregular, from 8½ to 11 or 12 fathoms in some places, particularly contiguous to Tree island bank, and the edges of the other banks projecting from the coast of Sumatra, also in the vicinity of Arend and Boreas banks in the offing. It will be, however, prudent to borrow towards the main if the depths increase to 12 or 13 fathoms; and to haul of from it if they decrease to 8½ or 9 fathoms towards the banks that line the coast. Near these, the soundings are generally hard and more irregular than farther out from the land, in 12 or 13 fathoms; but in the latter depths a ship will be too far off the coast with a westerly wind.

When the weather is clear, during the day, it may be proper to get a sight of the coast from a large vessel at times, edging out occasionally in the night, or when the depths decrease to 8½ or 9 fathoms. Having passed the bank off Tree island, the coast may be approached with greater safety, and the depths will decrease regularly steering northward for Lucipara island, to 5½ fathoms, when it bears N. ½ E. about 10 miles.

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If at night a vessel should come into shallow water between Two Brothers islands and Lucipara island, and not being certain whether she is on either Arend, or Boreas banks, or that off the coast of Sumatra, it is advisable to anchor immediately, and to wait for daylight, for the depths are moderate, and the bottom throughout this track generally favourable for that purpose.

From Banka Strait to Sunda Strait.—When bound from Banka strait to that of Sunda the proper course would be about S. by E., keeping in from 9 to 13 fathoms; but the currents are too variable to trust implicitly to any course, and the depths also are too irregular to depend upon them alone, for the 5, and 4½ fathoms on Boreas, and Arend banks may be easily mistaken for those south-eastward of Tree island, which are very dangerous. It will therefore be advisable in day-time to keep on the Sumatra side in 8 or 9 fathoms, from which depths that shore is generally visible from the deck, and at night to keep off shore when the water shoals to less than 9 fathoms, and to approach it when it deepens to more than 13 fathoms, as that depth with westerly winds would be too far off.

Having arrived in about 4° 40′ S., or about 30 miles distant from Two Brothers islands, keep as nearly as possible in 9 or 10 fathoms, so as to get sight of these islands bearing South, but not to the eastward of that bearing in order to avoid Clifton shoal (page 197); otherwise, if made when in 11 fathoms, it would be difficult to weather them with a westerly wind, especially as the currents run to the south-eastward during the western monsoon. When passing to the eastward of Two Brothers islands take care to avoid Brouwers reefs and Lynn bank.

Coming from the northward Two Brothers islands appear like one island, and hence some vessels have been led into danger by mistaking mount Imbong, or Knob-hill, in Sumatra, when seen in the twilight, for these islands. Sailing past these islands at night, the vessel's position should be well ascertained before dark, or else it would be better to anchor.

Having passed on either side of Two Brothers islands, the safest bearing to bring them upon appears to be N. ½ E. After losing sight of them upon that bearing, a course about S. by W. may be steered for the entrance of Sunda strait.

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CHAPTER V.

BANKA STRAIT—AND NORTH-WEST AND NORTH COASTS OF BANKA ISLAND.

VARIATION 1° 10′ East in 1878.

GENERAL DESCRIPTION.—Banka strait separates the islands of Banka and Sumatra, and trends with many bendings to the north-westward.*

The coast of Sumatra is very low, densely covered with wood, and offers no other variation than a few points, or rather roundings, which are only clearly distinct at short distances, and are easily mistaken for the so-called false points, which are observed immediately after rounding the real points. The shore being inundated at high flood, the distance from it is generally over-estimated.

Banka island is covered with hills and mountains, varying from 930 to 2,320 feet in height; and it is remarkable that, notwithstanding their comparatively small height, their summits are generally covered with clouds, which accounts for the erroneous height given to these hills by various authors, who have estimated them at upwards of 9,000 feet.

On the Banka coast are prominent points, sandy beaches, and in some places deep bights, as on the Sumatra side; as a rule, wherever sand occurs casuarina trees will be found, the other trees are principally pune, teak, and aspen. Near the western point of Banka stands the capital of the colony (or residency) of Banka, named Mintok, and its roadstead is much visted by the coasters that supply the Chinese miners with rice.

The whole coast of Sumatra is bordered by a mud-flat, which is narrower off the points, but in some of the bights from 2 to 4 miles wide. Towards the Banka side the bottom becomes gradually harder, and even rocky. Besides the few small islets and rocks in this strait, there are the group of Nangka islands, where vessels sometimes proceed to procure fresh water and wood. Many rivers discharge themselves into the strait,

* *See* Admiralty charts:—Gaspar and Banka straits, with plans of Lucipara and Stanton channels, and Nangka islands, No. 2,149; scale, $m = 0{\cdot}14$ of an inch. Banka strait with views, No. 2,597; scale, $m = 0{\cdot}25$ of an inch. Banka strait, south entrance, showing Lucipara and Stanton channels, No. 2,808; scale, $m = 0{\cdot}7$ of an inch.

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of which the principal are the Soengsang and the Assing, both navigable to a great distance for vessels of heavy burden.

The entrance to Banka strait is encumbered with numerous long and narrow banks of sand, having various depths of water over them, and deep channels between. Only two of these channels, however, are available for the ordinary purposes of navigation, as it is not possible to give any directions which would enable vessels to use the others with safety; but in the event of a vessel from accident or other cause finding herself amongst the banks, she would be enabled by careful attention to the Admiralty chart to extricate herself without much difficulty.

Until the survey of this strait by Mr. W. Stanton, assisted by Mr. J. W. Reed, Masters, R.N., in H.M.S. *Saracen* during the years 1859 and 1860, very little was known of the banks at its entrance. The Dutch had published a chart compiled from the observations of the officers of the Dutch men-of-war employed at various times on the station, which furnished a tolerably correct outline of the coasts on both sides the strait, and showed the positions of the prominent dangers in the fairway, but the soundings on it were very imperfect, and the space eastward of Lucipara, occupied by the numerous long narrow sand-banks above referred to, was almost a blank.

The ordinary route of vessels up to the time of the *Saracen's* survey was through Lucipara channel, between Lucipara island and the Sumatra coast; but the advantages which a navigable channel along the Banka island coast would offer to vessels passing through Banka strait had been long felt by seamen, and Baron Melvill in the Java Guide remarks upon this want as follows:

"The passage between Lucipara and Banka would have gread advantages in entering or leaving Banka strait, were it not encumbered so much with shoals and banks, the positions of which are not known correctly, and which render this passage unsafe, at least for large vessels, although Commodore Watson took the *Revenge* by night to the eastward of Lucipara, into Banka strait, and had not less than 5½ fathoms water. For vessels of light burden working to windward during the north-west monsoon, this eastern channel into the strait is very desirable, as it is almost impossible to make any progress against the strong and continual currents in Lucipara channel."

During the *Saracen's* survey, an excellent passage, now named Stanton channel, nearly three miles wide in its narrowest part, and with depths varying from 7 to 20 fathoms, was found between Lucipara and Banka. Mr. Stanton gives the following reasons for preferring this channel to the old one between Lucipara and Sumatra.

"Stanton channel will be found to possess many advantages over that of Lucipara, for it is a mile wider, the approaches to it are marked by well

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defined hills on Banka island, and a vessel of the largest draught may pass through it at any time of tide; whereas vessels frequently get on shore in using the latter channel, for the coast of Sumatra, consisting of low muddy mangrove shores about 50 or 60 feet in height, is unmarked by a single conspicuous object to assist the seaman to clear the mud-flat bordering its entire length, and which a few miles southward of Lucipara point extends 11 miles from the land. Lucipara island is also small, about half a mile in length, and no marks can be given to avoid the rocks extending a considerable distance to the southward and eastward of it.

"The water also in Stanton channel being much deeper than in Lucipara causes the banks, which are mostly of sand, to be easily recognised by the light colour of the water on them. The tide also ebbs and flows more regularly in this channel, and sets directly through it, which enables vessels even in calms to drop through; whereas in light winds and calms they are often set over amongst the dangerous banks whilst rounding First point in endeavouring to get through Lucipara channel.

"The wind in the north-west monsoon blows off the Banka coast, and throughout the year land breezes generally occur during the night. A strong land wind from the north-east has been experienced in Stanton channel during the south-east monsoon, when the wind was blowing directly through Lucipara from the southward.

"There is also but little variation in the depth of water between the Sumatra coast and the Lucipara shoals; and it is stated that during the months of January, February, and March, when the north-west monsoon is at its full strength, the southern current continues from 14 to 18 hours successively, with a velocity of 2 to 2½ knots, which would make it almost impossible for an indifferent sailing vessel to make any progress against it. It is also said that during the latter part of the south-east monsoon, it frequently blows hard from the south-west, accompanied with much rain; this would considerably retard vessels going to the southward through the Lucipara channel, and offer a fair wind to those proceeding through the Stanton channel."*

* The following extracts of letters, the first published in the latest edition of Horsburgh, and the second in the Mercantile Marine Magazine of 31st March 1863, will be useful to show the opinion of officers of the mercantile marine upon the advantages of the Stanton channel:

"Singapore, November 15, 1860.—Finding that all the vessels in company were steering for the Lucipara passage, I immediately altered course and steered for the Stanton channel, being the only one out of 10 or 12 vessels that adopted the new route; probably they were not provided with the recent survey. At six the same evening we anchored at the entrance of the channel. The next morning the wind was de ad against

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Commander W. Chimmo, H.M. surveying vessel *Nassau*, 1870, however, stated "that pilots from Singapore to Batavia still invariably use Lucipara channel," as they say "we always know where we are by the lead, as we "keep it constantly in hand, whereas in Stanton channel we should have "to stop to get a cast." Also that all points on the west side of Banka strait are steep-to and easily distinguished from a distance of 7 or 8 miles.

WINDS.—The winds in Banka strait follow the direction of the coasts, though with slight variations from the influence of the land and sea breezes; and fresh breezes may always be expected when working against the monsoon.†

TIDES, and CURRENTS.—The tides in Banka strait are strong but irregular, and are greatly influenced by the monsoons. The flood-tide, entering the strait from the southward out of the Java sea, meets another flood, about Nangka islands, coming from the northward out of the China sea. The direction of the streams is entirely influenced by the windings of the strait, forming, at their meeting, whirls and eddies in the bights of the land.

In Lucipara channel and the southern parts of the strait, sometimes there are two, but generally only one ebb and flood in the 24 hours, the former running to the southward and the latter running to the northward. During the months of January, February, and March, at the greatest strength of the north-west monsoon, the southern current continues often from 14 to 18 hours successively, with a rate of 2 to

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us, but the tide being favourable, weighed and turned to windward; a fair breeze springing up in the afternoon enabled us to stem the ebb, and by midnight we were abreast of Lalarie point; had no occasion afterwards to anchor, and was through the strait in 36 hours from the time of weighing. The next day several of the vessels that came through the Lucipara channel were seen far astern; this would show the advantage to be derived from using the Stanton channel. Another feature in its favour is its breadth. Being 3 miles wide in its narrowest part, there is some room to turn a ship to windward; besides which, the tide setting fairly through prevents a vessel drifting on the sands when becalmed, as in the case of the Lucipara channel. I am persuaded it will eventually be the high road in and out of the strait for square-rigged vessels, as any person once adopting it will never use the other.

"At Anjer I met Captain Gell, of the barque *Onyx*, from this port. He beat through the channel and spoke in the highest terms of it, as did Mr. Vaughan, master attendant of Singapore, who was a passenger in the vessel. C. G. March, commander of the ship *Charlotte Jane*."

Thomas Mitchell, commander of clipper ship *Queen of Nations*, says—"By going through the Stanton channel we were only 15 hours getting through Banka strait. The Stanton channel only wants a trial to be approved of, and if once used would always be adopted in preference to the Lucipara. I have sailed through the latter many times both ways, but will never do so again while such a safe one as the Stanton channel is in existence."

* Seaman's guide round Java, page 257.

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3½ knots; the flood-tide is then very trifling, and sometimes not at all perceptible. On the contrary, during the south-east monsoon, the stream of flood runs sometimes 14 to 18 hours with great velocity into the strait, and the ebb runs out during the other 10 or 8 hours with but little strength.

In the northern parts of the strait during the north-west monsoon, the southern current or flood remains longer and is stronger than the ebb, and the reverse during the eastern monsoon. The velocity of the tide is sometimes 2 or 2½ knots, and the range from 7 to 12 feet, and sometimes more; and in the mouth of the rivers the water during the western monsoon, from the heavy rains which prevail at that period, is much higher than during the south-east monsoon.

Between the monsoons flood and ebb succeed each other generally every 12 hours, and the one or the other is then stronger, according to the wind being northward or southward. The rise of an ordinary tide is 5 to 7 feet, and a spring tide 9 to 10, and sometimes 12 feet; but the average rise seems to be much greater during the eastern monsoon than during the western one.*

Mr. Stanton observes, that on the Sumatra shore, when the monsoon is blowing strong, a constant surface current will be found setting to leeward, and extending nearly mid-channel, except between Fourth and Batakarang points, where it is influenced by the numerous branches of Palembang river.

On the Banka coast, owing to the formation of the land more regular tides will be found, therefore, vessels in working should only keep on the Sumatra side between Batakarang and Fourth points, and when Tanjong Tadah bears N.E. ¾ N., work along the Banka coast, as by so doing and leaving either extremity of the strait at low water, they may carry a fair tide all the way through, and generally have the advantage of a land wind at night.

Throughout the strait, a difference of 12 hours in the tides was observed in the opposite monsoon. It is high water, full and change, in the south-east monsoon about 8h. 30m. p.m., but in the north-west monsoon high water takes place at nearly the same time in the morning.

Eddies in the Bights.—When working through the middle of the strait during the strength of the monsoons, continuous and contrary currents are certain, and the skilful seaman will therefore find great advantage in availing himself of the eddies, as well as of the more regular changes of tide, by standing into the bights and bays in those parts of the strait where he can safely approach the land.*

* Seaman's guide round Java, page 258.

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Inshore Tides.—In the Tobóe Ali channel, also in the bay north of Nangka islands, and in the passage between Karang Brom-Brom and Banka, we meet, even in the north-west monsoon, a regular succession in the roadstead tides. It has been often observed, when passing Mintok road that the vessels were lying with their heads in a contrary direction to those at anchor upon the bank outside. In that road the flood comes from the westward, and the ebb from the eastward; but near the mouth of Assing river the contrary occurs; the flood there runs west and the ebb east. In the bays between Eerste and Tweede points, and again between Derde and Vierde points, there are probably eddies of which vessels of light burden may make use, and heavier vessels may no doubt, in many places, run close enough to the shore to keep out of the influence of the currents.*

Freshets.—Between Bata-karang and Fourth points the ordinary current in Banka strait after heavy rains is considerably accelerated and diverted in the direction of Kalian point, until it nearly reaches mid-channel, by the freshets from the many rivers in this vicinity. Vessels sometimes take advantage of this to complete water, as it is frequently quite fresh on the surface.

During the north-west monsoon, which is the rainy season, these freshets set out of the rivers on the Sumatra coast with great force, and they require to be carefully guarded against in the night. Upon one occasion, when H.M.S. *Saracen* was at anchor near Lalarie point, her decked pinnace, moored at the boom, was fairly pressed under the water and swamped by the force of the current.

LUCIPARA ISLAND; AND COAST OF SUMATRA FROM LUCIPARA POINT TO BATAKARANG POINT.

LUCIPARA ISLAND, 164 feet high, at the southern entrance of Banka strait, 9 miles East of Lucipara point, is half a mile long, W.N.W. and E.S.E., a quarter of a mile broad, and covered with trees; the island is visible in clear weather at 14 or 15 miles. It is surrounded by a reef, which from its south-east end extends rather more than 1½ miles; and around this reef is a bank, with 2½ and 3 fathoms over it, extending about 1¼ miles to the north-westward from the island, and 2 miles to the south-eastward of it.

Rocky Patches.—Lucipara should not be approached on its south-east side nearer than 3½ miles, for a rocky patch with 2½ fathoms water over it lies S.E. by E. ½ E., distant nearly 2½ miles from the island; and half a mile to the south-westward of this patch is another of 3 fathoms.

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LUCIPARA POINT, which orms the south-western limit of Banka strait, is covered with trees, the tops of the highest being 89 feet above the level of the sea.

The Coast between Lucipara and First points is formed of mangrove jungle, and was found in the survey of 1859 to extend considerably more eastward than shown in the Dutch chart. This extension has evidently taken place since their survey in 1818, and it may be attributed to the sediment from the numerous small rivers in that vicinity affording more soil for the growth of the prolific mangrove. The contour of the dry mud was obtained and sounded close to at the springs, and it will be a guide to show any farther extension.

The Dutch naval officers have evidently been long acquainted with this fact, and they state that the whole coast of Sumatra facing Banka strait in the bights, and wherever mangrove is found growing, is annually progressing outwards. This remark applies to the bays, and more especially to the outlet of rivers, but not to First, Second, and the other principal points, where a different kind of tree will be found, and the rapid current sweeping round these abrupt points prevents any farther extension taking place.*

GREEN POINT, so called from the trees on it being of a lighter and brighter green than elsewhere, bears N. ½ W., distant 9 miles from Lucipara point, the coast between forming a bight about 1¼ miles deep. Between these points is a ridge of high trees standing about 1½ miles back from the coast line, with a conspicuous tree 153 feet high, near their centre.

EERSTE or First Point, bears N. ¾ W. distant 4¼ miles from Green point, the coast between forming a bight. The trees on it are of equal height, 60 feet, and present a level appearance.

MUD-BANK.— From the southward the coast line approaches Lucipara point in a north-easterly direction; but the 3-fathoms line, which may be considered the edge of the mud-bank which fronts the whole coast of Sumatra, from a distance of 10 or 12 miles southward of the point, approaches it nearly straight in a N. by W. direction, and passing Lucipara point about 2 miles off, follows, with a slight curve in towards the coast, the same general direction until abreast of Green point, from which it extends a little over a mile; it then takes a direction a little more westerly until abreast of the south part of First point, from which it is distant three quarters of a mile. The bank lies close to First point, and on its north-east side projects only about a quarter of a mile from the shore.

* W. Stanton, Master, R.N.

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From 10 or 11 miles to the southward of Lucipara point, to within 2 miles of Green point, the soundings decrease regularly towards the bank but just to the southward of, and fronting Green point, the water shoals suddenly from 6 to 3 fathoms, and therefore this part of the flat should never be approached into less water than 7 fathoms. Near First point the bank is also steep-to, especially on the north-east side, and should not be approached under 12 or 10 fathoms, those depths extending to the distance of one to 1½ miles from the point.

The Coast from First point trends in a N.W. by W. ¾ W. direction for 6½ miles to False First point, having a small bight or indentation between, at about two-thirds of that distance from First point. From False First point it recedes S.W. by W., about 3 miles, and then forming a deep bay, gradually curves round to a small point (False Tweede point of the Dutch) whence it extends nearly straight about N. ½ W. for 7 miles to Tweede or Second point.

VALSE EERSTE, or False First Point.—The trees upon this point are more elevated than those on First point, being 105 feet high. Lalarie point on the Banka side, bears from it N. ⅓ W. nearly 7½ miles, and Second point N.W. ¾ N. 18½ miles.

The mud-bank projects two-thirds of a mile from False First point, and more than 3 miles from the shore in the depth of the bay between that point and Second point. The bank is very steep close-to, and should not be approached under a depth of 12 fathoms near the points, nor under 10 fathoms in the bight between them.

TWEEDE, or Second Point, the trees on which are 81 feet high, bears from First point N.W. ¼ N. 24½ miles, and from Lalarie point N.W. ¾ W. 13 miles. From this point the coast recedes, and curves round until within 5 miles of Third point, forming a bay about 5 miles deep; it then extends nearly straight to Third point.

The mud-bank extends about two-thirds of a mile from Second point, and being very steep-to should not be neared under a depth of 12 fathoms. Between Second and Third points, it lies nearly straight from point to point, filling up the bay. The soundings here do not, as a general rule, shoal so suddenly as they have been described to do between the other points, but at 2 or 3 miles south of Third point the bank curves out considerably, and is dangerous to strangers, particularly when coming from the northward, as they are likely to infer that the bank recedes in the direction of the land. The depths, too, here again begin to shoal suddenly, adding to the danger, so that it is necessary to exercise caution and give a good berth to this part of the bank.

A Spit or Horn extends 1½ miles from the above mud-flat, and then in a south-easterly direction for 2 miles, with depths of 2½ to 3 fathoms,

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mud, on it, and 4 to 5 fathoms between it and the flat; from its northern extreme Second point bears S.S.E. 8 miles, and Parmassang peak E. by S. 12½ miles; therefore in passing this spit, Second point should not be brought eastward of S. by E. ¾ E. until Parmassang peak bears E.S.E.

DOUBTFUL PATCH.—There is said to be as little as 4 fathoms over muddy bottom, with Little Nangka island bearing North, and the middle of Parmassang hill East.

DERDE, or Third Point, bearing N.N.W. ¾ W. 20½ miles from Second point, is 78 feet high. From this point the coast trends about W.S.W. for 2 miles to the entrance of a small river, named Songi Kisoegean, which, from native information, is said to connect with a branch of Palembang river; the coast thence curves round in a W. by N. direction to Fourth point.

The mud-bank does not extend more than half a mile off Third point, but it is very steep-to, and should not be approached under three-quarters of a mile, or in less than 15 to 13 fathoms water. Between Third and Fourth points the bank is nearly straight, the edge of it being distant one to 1½ miles from the shore, except in front of the bight just to the westward of Third point, where it is 2 miles distant from the shore.

The soundings between Third and Fourth points are irregular, but vessels may, with careful attention to the lead, stand towards the mud-bank into 7 or 6 fathoms, until nearly abreast of Fourth point, where the bank is steeper, having 10 fathoms close-to, and only 8 fathoms a little farther off.

FOUR and THREE-QUARTERS FATHOMS BANK.—A mud-bank about 2 miles in length, and three-quarters of a mile in breadth, and having 4¾ fathoms water over it, lies between Third and Fourth points, about two-thirds of the distance from the former, and nearly 3 miles from the shore; between this bank and the edge of the mud-flat extending from the shore, is a channel about three-quarters of a mile broad, with 7 to 9 fathoms water in it.

VIERDE or Fourth Point bears from Third point W. ½ N. distant 23¼ miles. The trees upon it are 112 feet high.

The coast from Fourth point stretches westward for 22 or 23 miles, and in this space the different branches of Palembang river fall into the strait.

Banks off Fourth Point.—A bank of sand and shells, having 4¾ to 6 fathoms water over it, lies 4 miles off Fourth point. It is 3 miles long W.N.W. and E.S.E., about 1¼ miles broad, and from its western extreme Fourth point bears S. by W. ¼ W. 3 miles, and from its eastern

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extreme S.W. by W. ½ W. 4 miles. Between it and the mud-bank extending from the shore there are 7 to 9 fathoms water.

Another patch, about a mile in extent, and having 6 fathoms water over it, lies nearly 2 miles north-eastward of the last-mentioned bank, with Fourth point bearing S.W. ¼ S. 6¼ miles, and the dry rocks on the Brom-Brom reef N.E. by N. 3 miles.

Between these banks the depths are 8 to 14 fathoms.

The MUD-BANK from Fourth Point trends in a W.N.W. direction for 18 miles, thence nearly South, forming one side of the entrance to Songi Soengsang; a spit projecting from the land forms the other side of the entrance to that river, as also the south-east side of the entrance to Songi Assing.

Caution.—This bank for 6 miles westward of Fourth point is composed of hard sand, covered with a thin stratum of soft mud, and is exceedingly dangerous, being steep-to, and many ships, including H.M.S. *Himalaya* and *Assistance*, have grounded upon it. The lead cannot at all be relied upon for giving warning in time to avoid it, for 11 fathoms may be had and the vessel be aground the next instant. The safest plan is not to pass Fourth point within 3 miles, and having passed it not to bring it to the eastward of S.E. ½ S., until Monopin hill bears North.

Depths of 10 to 12 fathoms will be obtained close to this steep bank, outside of which there are 8 and 9 fathoms; increasing again to 10 and 13 fathoms, so that it is not possible to discover a vessel's position by the lead only. The soundings, however, become more regular off the mouths of the Palembang rivers, and towards and abreast Batakarang point, and if the lead in those localities be properly attended to, a vessel can proceed with ease and safety, as the soundings decrease regularly towards the shore.

Great care, however, is requisite in navigating this part of the strait during the rainy season, for large drifts are then brought down these rivers by the freshes, which set strong over to the west end of Banka; and as the flood runs strong into them on the springs, a vessel may be driven too near either shore, both sides of which are fronted by dangers (*see* page 206).

SUMATRA RIVERS.—To the westward of Fourth point are the entrances of Saleh, Oepan, Soensang, and Assing rivers; the last two are navigable for vessels of light draught as far as Palembang.

SONGI SOENGSANG or Palembang River.—Mr. Stanton has furnished the following account of this river and town:—Since the survey of the north-west part of Banka strait in 1860, a deeper and more direct entrance to the main channel of this river has been formed, having 9 feet at low, and 22 feet at high-water springs.

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This new entrance is marked with beacon poles, similar to those in the old passage, but on account of the many floating trees and strong freshes, they will probably not remain long in their position, a vessel of large draught may safely enter at high water by bringing the trees forming the west point of the river entrance to bear, S. by W. ¾ W., and steering for them on that bearing until Pulo Payong (Umbrella island) bears South; then steer for the island, but take care in approaching it to keep close to the eastern bank of the river, to avoid the spit extending 2 miles off its north end. If a pilot be required one may be obtained at Kampong Soengsang, the small village on the left bank, but there is no channel available for vessels on the west side of Payong.

This branch of Songi Soengsang at its entrance is upwards of a mile wide, but within the navigable channel is contracted in some places to the width of a cable by the different islands and banks, until close to the town of Palembang, when the river widens to three-quarters of a mile with 5 and 6 fathoms close to the shore.

The river is navigable for vessels as far as the town by keeping close to the right bank; but those of large draft are recommended, when passing Pulo Singris and the bank off Kampong Maya, to keep near the opposite shore. Both sides of the river are wooded, and on nearly all the isolated banks there are small trees, and on others fishing stakes, consequently there will not be much difficulty in avoiding them.

PALEMBANG, one of the largest Malay towns in the Archipelago, and the largest in Sumatra, derives its name from the many bridges across the numerous creeks that intersect it. A Dutch resident and other officials reside here, and to support their authority there is a military force consisting of one European and two native companies. In 1860 the total number of Europeans in the town was 109, and by the previous census the native population consisted of 45,000 Malays, 4,000 Chinese, and 1,000 Arabs. The climate in the vicinity is considered so salubrious that convalescent soldiers are sent here from Banka.

Near the extreme end of the town, commanding the mouth of the Ogan river, is a substantially built fort. It is a square enclosure of masonry, with walls 8 feet thick, about 50 feet high, loop-holed, and at each angle a circular bastion mounting 8 guns in casemate embrasures. The fort could easily accommodate 1,500 men, and is surrounded outside with strong wooden palisades, a thick bamboo hedge, and a ditch 20 feet broad. The fort is in lat. 2° 59½′ S. There are several smaller forts some distance up the river.

Covered prahus (called bedahs) daily arrive from the interior, laden with large supplies of cotton for exportation. This useful article grows

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quite wild some distance up the river, in some places close to the stream, and covering many miles of land. The greater portion of it is sent to Batavia. The total quantity exported in 1860 was estimated at 1,735,500 lbs.

All the necessaries of life are here found in abundance. The country abounds in large game, deer, wild pigs, &c.; and the river with fish. Beef, fruit, vegetables, &c. are cheap and plentiful. Foreign vessels are not permitted to trade, and Dutch European vessels are not allowed to enter the river unless under special circumstances. The export trade, consisting principally of pepper, rattans, cotton, honey, dye woods, and gutta-percha, was in 1860, confined to 18 European built ships, and numerous country craft, all owned by wealthy natives.

From November to March rains prevail, and the wind varies from N.W. to N.E. At this period vessels belonging to Palembang either remain in port or trade to other places, as it is almost impossible for sailing vessels at this period to make any progress up the river against the freshes. During a stay of five days off the town in January, the influence of the flood was not once felt. The ebb slackened during the day, but at night it often ran 5 knots. After much rain the freshes out of the river are felt in Mintok bay.

SONGI ASSING or Salt River* offers the best passage to Palembang, being at all times navigable for vessels of heavy burden, but the shallow at its entrance often causes a delay of several days. At its mouth, which was surveyed in the beginning of 1846, Monopin hill bears N.E. by E., and Valsche or False point N.W. by N. At the entrance, in mid-channel, there are 8 to 10 fathoms; and close to the poles at the bank on the eastern side of the channel 4 to 5 fathoms. Higher up this river the Pontian and Jarang channels are just as good as that through the Soensang.

Directions.—To enter Songi Assing, bring Monopin hill to bear N.E. by E., and False point N.W. by N., then steer in a S.W. direction, according to the state of the tide, for the ebb runs strongly over the very shallow outer bank towards Songi Soensang, and the flood towards the inner banks.

Having reached Api point, take the mid-channel, between the beacon-poles, towards Bayam point, and then, though still following the middle of the river, keep rather towards the Laga point side, round which the Pontian channel is entered. With a flood tide keep on the eastern shore, as the stream runs with force past that channel; taking care, at the same time, to avoid the shoals which surround the point. In this river care is

* Seaman's guide round Java, page 267.

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necessary when passing the points, as from most of them project small mud-banks.

Pontian and other Affluents.—The junction of Pontian, Kietjar, Gassing, and Sebalick rivers, which last unites Pontian to Jarang river, causes a part of the ebb to run from the first two rivers, through Sebalick, and compels vessels having come so far with the flood to anchor, and wait for the ebb. Pontian river is generally deepest on its western side, except near its mouth, where the greatest depth is in the middle; but again towards the western side, higher up, and in front of the shoal off the point, between Kietjar and Sebalick rivers. When near its junction with Sleino and Jarang rivers, keep close to the eastern shore, in 6 to 8 fathoms, to avoid the reef which projects from the point between Sebalick and Jarang. When there is no wind it is necessary to anchor and wait for the flood coming up by Sleino river, in order to proceed up Jarang, and it will be found that a great part of the flood goes into Tambangadin river, while that going up Jarang is very trifling. Having reached Jarang Ketjil, anchor again till high water, to wait for the ebb from this river, which will soon take the vessel into Songi Soengsang.

Jarang Bank.—The bank off Jarang river is very shallow, but on the north side there is a narrow passage with 5 or 6 fathoms. Vessels of less draught than 15 feet can also find a passage on the south side.

Assing river, always navigable.—The difficulties in going up Assing river, caused by the narrowness of Pontian, Sebalick, and Jarang rivers, and the necessity of stopping so often to wait for the tide, are amply compensated by the advantage that vessels of even the greatest burden suffer no delay at its mouth.

Freshets.—The heavy rains in the interior cause such strong freshets to run out of the river (especially during the north-west monsoon) as to reach towards the opposite shore, and that in the spring (especially during the south-east monsoon) very powerful floods pour into the rivers. A considerable distance up the rivers ripplings like breakers are seen, caused by these tides and freshes, which frequently bring down large detached masses of grass and brushwood like floating islands.

BATAKARANG POINT, the north-west boundary of Banka strait, bears N.W. $\frac{3}{4}$ W. 32 miles from Fourth point, and may be identified by a group of trees, 130 feet high, which gives it a bluff and jagged appearance.

Valsche or False point is more sloping and flat, and lies 9 miles to the south-eastward of Batakarang point; and there is another point about 3 miles in the same direction from Batakarang point.

The mud-bank projects $4\frac{1}{2}$ miles off Batakarang point and 2 miles off False point; it then trends to the south-westward, bounding the entrance

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of Songi Assing on its north-west side, to Tanjong Kampie, from which it projects not quite a mile.

The soundings off Batakarang point are regular, and the point may be passed in 6 to 4½ fathoms water.

SOUTH COAST OF BANKA.

This coast, which separates Banka and Gaspar straits, is treated of here, as being intimately connected with the former, for Mr. Stanton observes that at the entrance of Banka strait, in the south-east monsoon, the ebb tide during the night at springs will be found setting to the south-eastward; consequently many vessels, although steering a course for the strait, get set between Dapur islands and Tanjong Baginda.

This part of the south end of Banka island being almost a blank (on the Dutch chart), was surveyed by the *Saracen*, and the coral reef searched for, reported as lying 15 miles from the south end of Banka. (*See* foot note page 215.)

The coast between Tanjong Baginda and Dapur islands, in extent about 14 miles E. ¾ N. and W. ¾ S., is generally low, and covered with trees; it presents, however, some points sloping down from hills of moderate elevation. It should not be approached under 3 miles, for it is fronted with a mud-bank extending in places nearly 2 miles from the shore, upon which are many rocks above, and many others below water.

TANJONG BAGINDA, the south-eastern extreme of Banka, slopes gradually in a south-easterly direction from a hill 387 feet high, a mile inside the point. Two miles inside the point, in a N.W. by W. ½ W. direction, is another hill, named Baginda peak, 521 feet high.

DOEYA POINT, bears S.W. by W. ¾ W. 2 miles from Tanjong Baginda, from which it is separated by a bay about half a mile deep. At 1⅓ miles N.N.W. from this point there is a hill 432 feet high, from which the land slopes down to the coast.

Rocks, some of which are above water, extend to the southward of this point and for more than a mile along the coast to the westward, to the distance of half a mile. The east end of a sand-bank lies about 1½ miles S.S.E. ½ E. from Doeya point, and extends to the westward until it meets the mud-bank which fronts the coast as far as Tanah-roboe point; on this sand-bank are several rocky patches.

KEYANG POINT, 231 feet high, bears West-southerly 2¾ miles from Doeya point, from which it is separated by a sandy bay about two-thirds of a mile deep.

LAIYAR REEF is a rocky reef above water, lying on the outer edge of the bank above mentioned, and S.W. by W. distant 1¾ miles from

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the east extreme of Keyang point. A short distance north-westward of Laiyar reef, lies a bed of rocks, some of which are above water.

BANTIL POINT, 240 feet high, bears W. by N. 2¾ miles from the nearest part of Keyang point. The bay between these points seems to be full of rocks; and large and small rocks above water, with others awash, extend to the southward of the point, nearly to the edge of the mud-bank which projects nearly a mile off shore.

TANAH-ROBOE POINT, 3½ miles W. by S. ½ S. from Bantil point, has several rocks, above and below water, projecting nearly a mile to the southward; the mud bank curves round this point at the distance of a mile nearly, and terminates just to the westward of it.

DAPUR POINT.—The coast from Tanah-roboe point trends west about a mile, and then curving to the north-westward into a small bay about half a mile deep, extends about S.W. by W with a rugged outline to Dapur point, under Toboe Ali Lama peak, which forms the south-western extreme of Banka. Adjoining Dapur point is an islet or rock 40 feet high, with smaller rocks above water on both sides of it.

From a distance of 7 to 10 miles, the rocks on Dapur point appear like a large town, showing out white against the trees in the background.

DAPUR ISLANDS* are two islets lying a little more than a mile S. by E. from Dapur point, and forming the south-eastern limit of the entrance to Banka strait by Stanton channel. They are nearly round, about a cable in diameter, and connected at low water by rocks. The southern one is 120 feet high, and is fronted by a coral sandy beach; some rocks above water lie about a cable to the southward, and a rock under water about 2 cables to the south-eastward of the islet.

There is a narrow channel, half a mile wide, with depths of 5½ fathoms, between Dapur islands and Dapur point; thence to Nangka point there are several white rocks lying inside the mud-flat close to the shore.

SAND-RIDGES off the SOUTH END of BANKA.—H.M.S. *Saracen* when searching for the coral reef reported by the Netherlands barque *Banka*,† (many prominent points offering good objects for fixing her position,) she was enabled to extend the soundings 20 miles off the land. When anchored near the reported position of the coral reef, several vessels passed south, from one to 6 miles distant; therefore it was

* Dapur, means cooking-place. Prahus, in passing, generally land on these islands to catch turtle, as it is the only place in Banka strait where they are seen.

† This coral reef, about 3 miles in circumference, and probably only 6 feet water on it, was reported as lying 15 miles from the south end of Banka island. Its position was given as lat. 3° 21 S., long. 106° 41′ E., and the land in sight (probably mount St. Paul, 930 feet high) bore N.N.W.

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useless to continue the search any farther in that direction, as it would have taken the *Saracen* directly in the track of vessels bound for Gaspar strait, where it is improbable that a reef of this extent should exist, and no other vessels have reported it.

The soundings were found to be very irregular, long sand-ridges, with deep water over a muddy bottom between. None of these banks have less than 5 fathoms on them, with the exception of one lying S.E. 1½ miles from Dapur islands, where there are several patches of 3½ fathoms over a sandy ground. At 7 miles E. by S. of these patches, and separated by deeper water, is a bank of 4½ fathoms, coral and sand, extending in an easterly direction for 3 miles; it appears to be a continuation of the Dapur bank, and from its shoalest part Baginda point bears N.E. by N. 6 miles.

This survey will now give mariners confidence to approach the south coast of Banka to 3 miles, and enable them at night to know their position by the soundings. As no soundings appear to have been taken by the vessel that discovered the coral reef, and as its position is placed directly in the track of vessels bound to Banka or Gaspar strait, and might occasion great delay to them by unnecessarily having to alter course, the reef has been erased from the charts, one of the overfalls mentioned below being probably mistaken for a reef.

Overfalls.—At full and change great overfalls were repeatedly noticed, caused by the meeting of the ebb stream from Banka and Gaspar straits over an uneven bottom. This has also been noticed by other navigators, and vessels were formerly cautioned not to approach the south end of Banka nearer than 4½ leagues.

SOUTH-WEST AND WEST COASTS OF BANKA; AND FREDERICK HENDRICK ROCKS.

TOBÓE ALI LAMA is a hill about 1¼ miles N.N.E. of Dapur point. Its peak is of pyramidal form, and rises to an elevation of 512 feet.

NANGKA POINT is 2 miles N.W. from Dapur point, and the coast between is fronted by rocks extending about half a mile from it. The edge of the bank is nearly a mile from Nangka point, and has 5 fathoms water close-to, so that it must be approached carefully. The point may easily be distinguished by a round hillock over it 264 feet high, and also the land receding, forming Tobóe Ali bay, the shore of which is low, and fringed at high water with sandy beaches inside the mud-flat, which here extends 2 miles off the land.*

* The shore mud-bank which fronts the coast between Dapur islands, and Lalarie point is described at page 219; between Lalarie point, Nangka islands, and Tanjong Tedong at page 222; and between Tanjong Tedong, and Mintok bay at page 225.

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TOBÓE ALI POINT, bearing N.W. by N., distant 5½ miles from Nangka point, has several white rocks near it, and a conspicuous single tree on its summit, which is 213 feet in height, and visible 14 miles off.

TOBÓE ALI FORT, with its red-roofed barracks, stands half a mile south-east of Tobóe Ali point, upon a low mound 40 feet in height, at the left point of entrance of a small river, on the banks of which is the village of Sabang, situated close to the fort, and containing (in 1860) a mixed population of 600 Malays and Chinese. At low water the river dries to a distance of 3 cables from its mouth. A Dutch Administrator, and a Captain with a small military force garrison the fort. (*Light proposed.*)

The anchorage off Tobóe Ali fort is in 4 fathoms, mud, with Tobóe Ali Lama peak bearing S.E. by E. ½ E., and Gadong peak in line with Tobóe Ali fort N.E. ½ N.; smaller vessels may approach on this bearing nearer the shore as the soundings decrease regularly. In southerly and south-westerly winds there is a heavy swell here which makes landing difficult.

Supplies.—No supplies of any description can be procured but water and wood; the former may be obtained at the above river, or at a small stream half a mile to the eastward of it, from half flood to half ebb.

MOUNT ST. PAUL, 5 miles E.N.E. from Tobóe Ali point, rises with a gradual acclivity on its south-eastern shoulder to a peak 990 feet in height, with two others adjoining, of nearly the same elevation, the western peak terminating rather abruptly to a lower spur in the direction of Gadong hill. When to the westward of Puni island, owing to a projecting spur from the middle peak, the eastern peak of St. Paul is hidden, and the western one then appears the highest, and forms, with the north-west brow, a saddle hill.

GADONG HILL is a pyramidal peaked hill 593 feet high, W. by N. distant nearly 2½ miles from mount St. Paul.

Owing to the land contiguous to these hills and to Tobóe Ali Lama being low, they appear as islands at a distance over 15 miles.

GOSSONG POINT bears N.W. by W. 4 miles from Tobóe Ali point, the land between forming a deep bay with low mangrove trees. A small stream falls into the sea on the north side of the point.

From Gossong to Laboh point the land is more elevated, the highest part being 250 feet in height, with rocky points and sandy beaches, between which are numerous rocks close to the shore.

PUNI ISLAND, lying midway between Gossong and Laboh points, is a small islet, 47 feet in height, and conspicuous from the white granite rocks forming its base, and other rocks of a similar appearance near it.

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LABOH POINT bears N.W. ¾ W. distant 12 miles from Nangka point. There is a hill, 250 feet high, about a mile to the eastward of it, and another, about the same height, and the same distance, to the northward. This point from the south-eastward presents a rather shelving appearance, with large white rocks extending from it, which, when seen from the westward have the appearance of a village, from the contrast they offer to the green verdure of the point. Prahus frequently anchor here.

DAHUN POINT is 7¼ miles N.W. by W. ¼ W. from Laboh point, and the shore between is low and covered with mangroves: a range of hillocks extends parallel to the coast, the highest of which is elevated 230 feet; there are also several small rivers.

The land at Dahun point attains a greater elevation, and is faced with sandy beaches and rocky points. At 4½ miles N.N.E. ¼ E. from the point is a round woody hill, 315 feet in height, and conspicuous from the high trees on it, and from there being no other hills near it.

Sail Tree.—Close to the coast, 2 miles N. by W. ½ W. from Laboh point, is a clump of trees, one of which (Sail tree) is a conspicuous square tree, 167 feet high, there being no others of the same elevation near it: in clear weather it may be seen 12 miles off, closely resembling a ship under sail.

PULO DAHUN, 30 feet in height, is one of a cluster of rocks lying off Dahun point, nearly all of which are covered at high water. It is remarkable by its having a solitary tree on it, whence its name, Dahun, in Malay meaning leaf or bough.

PANJANG HILL or Long Hill rises close to the coast between Dahun and Banka points. When seen from the south-eastward it shows as a wedge, with its greatest elevation, 316 feet, on the eastern end. From the north-westward it appears as a long hill rising to a peak near its centre, with one conspicuous tree.

Water.—A stream of fresh water runs close to the north side of this hill; the coast between it and Pulo Besar is low and covered with mangroves, off which there are several ledges of rocks.

BANKA POINT and HILL.—Banka point is 12½ miles N.W. by W. ¾ W. from Laboh point, and the land to the westward of it recedes into a bay. The point is about the same elevation as Pulo Besar, but at 1½ miles to the northward it rises to Banka hill, which from the south-eastward appears of similar shape to Panjang hill, but differs in having the highest part on its western extremity. From the north-westward it shows with a flat top, having three clumps of trees on its summit, the whole height being 256 feet.

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PULO BESAR is nearly connected with Banka point by rocks. Although its name in Malay signifies large, it can only be so in comparison with Pulo Dahun, it being but one-third of a mile in extent, and 63 feet high.

The Coast, from the foot of Banka hill, takes a W.N.W. direction for about 4 miles, when it turns more to the northward to the entrance of a small river; thence it curves round, forming a small bay to Pudi point, when it trends nearly straight for 5 miles in a W. by N. direction, to Lalarie point. The coast is covered with mangrove trees, and assumes the usual irregular outline of such coasts. The trees upon Pudi point are 108 feet high, and form two mounds, with a small gap between them.

Mamelon Hummock is a small round hill 265 feet high, standing by itself 3 miles inland in a N. by E. direction from Pudi point.

Two miles and a half E. by N. of Mamelon Hummock is another small hill; 2¼ miles N. by E. of which is a double-peaked hill, 396 feet high; and about 1¼ miles East-northerly of this last, is a hill 471 feet high, with a small range extending from it to the northward, and another to the north-eastward.

LALARIE or Langgong Point, 75 feet high, is covered with trees, and presents a bold bluff appearance on all bearings. It is the turning point into the main part of the strait for vessels that have passed through Stanton channel.

Anchorage.—Good anchorage may be obtained to the north-westward of Lalarie point, in about 7 fathoms, mud, with Lalarie point bearing S.E. ½ E., and Brani point N. ¾ W.

SHORE MUD-BANK.—A mud-bank fronts the whole coast just described between Dapur and Lalarie points. The 3-fathoms line may be considered to mark its edge, which, in most places, shoals very quickly inside that line.

From the rock close to Dapur point, the edge of this bank extends off only about a cable, when it curves outward, passing Nangka point about three-quarters of a mile off; it then recedes a little towards the outline of Tobóe Ali bay, and passing Tobóe Ali point about 1⅔ miles off, assumes an irregular outline towards Laboh point, from which it projects but three-quarters of a mile. After running past Laboh point to the north-westward for about 3 miles, it curves back, forming a sort of horn, projecting in an opposite direction; from this horn patches of bank extend to abreast of Tobóe Ali point. These patches are generally about 2 miles long and very narrow; they have 2½ and 3 fathoms of water over them, and lie between the sand-bank forming the eastern limit of Stanton channel, and the mud-bank fronting the shore.

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The outer edge of the horn just described lies about W.S.W. distant 2 miles from Laboh point; the bank from this extends nearly straight in a N.W. by W. ½ W direction for 2 miles beyond Pulo Dahun, where it forms another horn or spit, from which the eastern bank of the Stanton channel extends to the south-eastward (*see* page 235). From this second horn the edge of the bank assumes a somewhat regular outline towards Lalarie point; extending about a mile off Pulo Besar, the same distance off Pudi point, and about three-quarters of a mile off Lalarie point. The whole of this part of the bank is very steep-to, there being 6 fathoms close to the 3-fathoms line, and, in many places, but 3 feet just inside it; it must not be approached under a depth of 10 fathoms.

CASUARINA POINT, so called from a number of Casuarina trees on it, is nearly midway between and nearly in the same line of direction as Lalarie and Brani points. The coast between is low, with sandy beaches at high-water mark; several hills, from 300 to 400 feet high, rise at 3 to 4 miles inland.

BRANI, or Bold Point, 11 miles N. by W. ¾ W. from Lalarie point, is a termination of a spur from the Parmassang range, with a conical peak 516 feet high over it showing very prominently both from the northward and southward.

TIMBAGA or Copper Rocks, so named from their reddish colour, are three small rocks, lying East and West of each other, about a cable in extent. The highest and westernmost rock is 4 feet above high water, and from it Second point bears W. ¼ N. 5¾ miles, and Brani point N. by E. 3 miles. With a setting sun their reddish colour, from the contrast to the green verdure of the land, makes them readily identified. Shoal water, about half a mile in breadth, extends nearly half a mile to the northward of the group, and 2½ miles to the southward, and forms, with the shore and bank of Banka, a channel three-quarters of a mile wide.

Several shoal patches of coral and sand have been found nearly 1½ miles W.N.W. from these rocks, but they are all inside the 10 fathoms line, the depth vessels are cautioned not to go within when passing them (*see* page 244). These patches are about a cable apart, have 2 fathoms least water on them, and 8 fathoms close-to. In approaching them the soundings shoal suddenly from 20 to 10 fathoms.

From the middle patch of 2 fathoms Timbaga rocks appear nearly in line with a sharp peak (330 feet high) south of Bukit Limmaun, bearing E.S.E.; and the apex of a distant long hill (657 feet high) is just open west of a white rock off Tanjong Bedaauw, N. by E. ¾ E. These patches and Timbaga rocks will be avoided by not bringing Lalarie point south of S.E. ½ S., until Brani peak bears E. by N. ¾ N.

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A rocky bank, about a mile in extent east and west, and half a mile north and south, having 7 to 9 fathoms water over it and 14 to 20 fathoms close-to all around, lies W.N.W. of the shoal patches just mentioned. From its outer edge the largest Timbaga rock bears E. by S. ½ S., distant 3 miles, and Brani peak E.N.E. 5 miles. Lalarie point, bearing S.E. ½ S., which leads clear of Timbaga rocks and the above-mentioned patches, also leads just outside the edge of this bank.

Water may be procured at a stream about half a mile to the northward of Timbaga rocks, from half flood to half ebb, after which the mud prevents a boat approaching near the shore.

PARMASSANG RANGE is a chain of hills extending from Brani point in a N.E. by N. direction for nearly 4 miles, to the highest peak, which rises to an elevation of 1,608 feet; the range then turns more to the eastward, for a distance of about 3 miles, where it disappears.

When seen from the northward, a peak, which is not the highest, appears to be so, owing to the north-easterly direction of the chain. A spur of the range extends in a N.N.W. direction towards the coast, the end of which, named Bukit Salle, is 142 feet high.

TANJONG BEDAAUW is a bold headland, N. ¼ E. 3¼ miles from Brani point, the coast between forming a bay half a mile deep. A conspicuous white rock, 45 feet high, lies immediately off the point.

PULO PEMEIN is a small round island, 59 feet high, lying N.W. by N. 2 miles from Bedaauw point.

TANJONG KARRAH, 171 feet high, bears N.N.E. ½ E. nearly 3 miles from Tanjong Bedaauw; many rocks, some above and others below water, extend more than half a mile off this point.

SLAN BAY.—The coast from Tanjong Bedaauw recedes to the eastward, and between Tanjong Karrah and a point about 2 miles to the eastward of Nangka islands is a deep shallow bight, named Slan bay, into which Kotta and Slan rivers disembogue. From the latter point the coast trends, with a slight bend in towards a small river, about N.W. ¾ N. 3½ miles to Tanjong Tedong.

The entrance of Kotta river is 2½ miles north-eastward of Tanjong Karrah; and the entrance of Slan river is East-southerly, about 5 miles from the south point of Great Nangka island.

On the coast line in the depth of Slan bay is a conspicuous tree 196 feet high.

Slan is the chief town of a pangkal, or district, and is municipally governed by the administrator of the tin mines; here, as at all other chief towns of districts, a small number of Dutch troops are stationed.

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SHORE MUD-BANK.—The edge of the bank (page 220), is nearly a mile outside Lalarie point, and thence its direction is nearly straight, about N. by W. for 18½ miles, or for 2½ miles beyond Pulo Pemein, passing Casuarina and Brame points a little less than half a mile. It then assumes somewhat the form of Slan bay which it fronts, and surrounding Great Nangka islands projects a couple of spits or horns towards the bank extending northward from the middle Nangka; thence the edge trends in a north-easterly direction towards Tanjong Tedong, from which it extends little more than a mile.

About two-thirds of a mile south-westward of Tanjong Bedaauw, a narrow inlet, having 3½ to 5 fathoms water, runs into the bank in a north-westerly direction, and turns to the northward nearly as far as Pulo Pemein.

Northward of Timbaga rocks the bank may be approached to 8 or 7 fathoms, as far as a mile or two to the northward of Pulo Pemein, when vessels may stand in 7 or 6 fathoms, until near Nangka islands which should not be approached on the west side nearer than 12 fathoms.

NANGKA ISLANDS, three in number, lie about the middle part of the strait, 1½ to 4 miles distant from the shore of Banka island, and 8 or 9 miles eastward of Third point, on the Sumatra coast. Great Nangka, 285 feet high, is 1¾ miles long north and south, and 1¼ miles broad; Middle and West Nangka are each about half a mile long, the former being 125 feet, and the latter 205 feet high.*

Great Nangka is nearly half a mile within the edge of the mud-bank which extends from the Banka shore. From the Middle Nangka a bank of 2 to 3 fathoms extends S.S.E. 1¼ miles; from West Nangka a similar bank projects to the southward for nearly a mile, and S.S.E. distant three-quarts of a mile from its tail is a 3½-fathoms patch.

A small flat rock, 6 feet above water, named West reef, lies about 1½ cables off the west end of West Nangka; and another 32 feet high, named Tree rock, lies nearly one-third of a mile south-eastward of Middle Nangka, between it and Great Nangka.

A reef, named North reef, with rocks above and below water lies a quarter of a mile off the north end of Middle Nangka, the mud-bank extending off in the same direction about a quarter of a mile farther.

Between the banks which surround the islands are intricate channels 2 to 4 cables broad, having 4 to 7 fathoms water in them.

Water.—There is a stream of water on the west side of Great Nangka, and another and smaller stream on the north-east side; but both streams are frequently dry in the south-east monsoon, and owing to the

* *See* Admiralty plan of Nangka islands, scale, $m = 1 \cdot 8$ inches, on chart No. 2,149.

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mud-flats surrounding the islands, the watering places are difficult of approach for ships' boats. H.M.S. *Belleisle* was watering at Great Nangka night and day, and only filled 30 tons in 36 hours.

The natives are not to be trusted, but on the contrary much caution is necessary while watering, not to leave the casks, &c. without a sufficient number of men to protect them. The *Belleisle* nearly lost one of her crew by inadvertently leaving him alone for a few minutes.

Anchorage.—The south extreme of Great Nangka bearing E. ½ N., leads about a mile southward of the bank extending S.S.E. of the Middle Nangka; and Tree rock N. by W. ¼ W., clears the mud-bank off the west side of Great Nangka nearly the same distance. A vessel can anchor, with both these bearings on, in 5 fathoms, and be about 1¼ miles from the watering place; she should, however, approach this position with caution, and not attempt to go closer in.

Tides.—In the north-west monsoon it is high water, full and change, at Nangka islands at 7h. a.m., and the rise is about 9¾ feet. Many eddies and small races will be met with in the vicinity of these islands; they are caused by the tidal flood wave from the China sea meeting the flood from the southward.

TANJONG TEDONG, bearing N.E. by E. ½ E. 3⅛ miles from the West Nangka, is a conspicuous point 234 feet high, inside Nangka islands, to which it is connected by the mud-bank. A large cluster of rocks, some above and others below water, lie about a mile north-westward of the point, only a short distance from the edge of the mud-bank.

The Coast from Tanjong Tedong extends to the north-east into a bay, at the bottom of which is the small river Semboelan; thence it curves to the north-west to Tanjong Penegan, from which it recedes about a mile to the entrance of a small river of that name. The coast line from this river rounds the foot of the higher land sloping down from Mundo peak, and then forming a small bay, trends N.N.W. to a point bearing E. by S. 2 miles from the largest of the Meddang islands, when it again bends to the north-east for 1½ miles to the entrance of Mundo river.

From Mundo river the coast trends to the north-west about 8 miles to Tanjong Jurung-patt, forming the shore of Mundo bay, with a point about the centre of it projecting nearly a mile. The shore of this bay is low, and covered with trees, which, at the entrance of the Kotta Waringin river, are 121 feet high. Tanjong Jurung-patt, 240 feet high, is the western limit of Mundo bay. The land here begins to be more elevated, and continues to be so as far as the entrance of the Jiring river.

The coast from Tanjong Jurung-patt trends in a westerly direction nearly 3 miles to Tanjong Raya, where it recedes northerly about a mile

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to Tempelang river; thence it takes again a westerly direction for nearly 4 miles to Tanjong Ressam, the eastern extreme of Jiring bay. This latter point is prominent, and faces the south-west; it lies N.W. by W. 12 miles from Meddang islands.

Jiring bay is the deep bight between Tanjong Ressam and Tanjong Tadah, the coast trending away from the former point in a N.N.W. direction to the entrance of Jiring river, and thence curving round about W.S.W. and S.W. to Tanjong Tadah, which bears from Tanjong Ressam W. ½ S., distant 8¾ miles. The shore of the bay is low, with three conspicuous trees 152 feet high in its north-west part. Tanjong Tadah, 203 feet high, is readily recognised, the land on both sides being lower and curving into two bays, giving it a very prominent appearance.

Between Tanjong Tadah and Tanjong Puni, which lie nearly East and West of each other, about 8 miles apart, there are two bays, each about three-quarters of a mile deep, with a point having a hummock or mound 256 feet high upon it midway between.

Tanjong Sukal, 2 miles E. by N. from Tanjong Puni, has a hill 209 feet high upon it, and a small river on its west side.

Tanjong Puni is low, and the coast line rounds away very gradually on either side of it. Thence to a point 7½ miles to the N.W. by W. ½ W., the coast recedes and forms a bay about a mile deep; from the latter point to Tanjong Kalian, the bearing is W. ¾ S., and the distance nearly 4 miles, the coast between forming Mintok bay.

Conspicuous Landmarks.—There are several hills from 100 to 600 feet high on the part of the coast just described between Tanjong Tedong and Mundo river; Mundo peak, 512 feet high, and bearing E. by S. ¼ S. 4 miles from the Meddang islands, is the most convenient for determining the vessel's position.

About three-quarters of a mile to the eastward of Tempelang river is a small hill 263 feet high; and N.E. 3 miles from its entrance, is Bukit Tempelang, a hill 412 feet high; W. by N. ¾ N. from Bukit Tempelang is Bukit Pandin, 585 feet high, which will be found very useful when in this part of the strait.

Solitary Sharp peak, 661 feet high, is the summit of a sharp conical hill standing by itself, N. ½ E., distant 10½ miles from Tanjong Tadah; this is also very useful when brought in line with nearer objects, for giving a correct line of direction.

Four or 5 miles inland from the coast between Tanjong Puni and Mintok are some hills, one of which, Bukit Beloe, 773 feet high, serves as a mark to clear. Brom-Brom reef, and Amelia bank; a little to the westward is another hill 427 feet high.

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About 2 miles north-eastward of Bukit Beloe, is Bukit Panjang, or long hill, 661 feet high; and nearly 3 miles north-westward of Beloe, is a hill 454 feet high.

Meddang Islands are three in number, lying about 3 miles off the entrance of Mundo river, and forming the south-western extreme of Mundo bay, being joined to the main land by the mud-flat. The largest island is 147 feet high, and bears North 9 miles from West Nangka. A small island named Pulo Antu, lies about 1½ miles north-eastward of Meddang islands.

Pulo Sambayang is an islet 175 feet high, lying about E. ½ S. nearly 3 miles from Tanjong Ressam, and 1¼ miles W.S.W. of the entrance to Tempelang river.

Karang Sarabu are a cluster of rocks some above and others below water, extending in a S. by E. ½ E. direction nearly 2 miles from the point with a hummock on it between Tanjong Tadah and Tanjong Sukal.

MONOPIN HILL, or Gunong Monombing, rises near the west end of Banka, its summit being 1,458 feet high, may be seen at a considerable distance, and serves as a guide in approaching to or departing from the north end of Banka strait. It frequently happens at the north entrance of the strait, that this hill is the only visible object, especially when a vessel is near Sumatra in 5 or 6 fathoms water.*

SHORE MUD-BANK.—The edge of the bank (page 222), after passing a cable outside the rocks off Tanjong Tedong, takes a N.N.W. direction, till abreast of Meddang islands, outside of which it extends nearly a mile. Thence it curves round Mundo bay, projecting 4 miles to the southward of Tanjong Jurung-patt; it then extends to the westward, passing Tanjong Ressam at 4½ miles, and Tanjong Tadah at nearly 3 miles.

Mundo peak, well open to the southward of Meddang islands, leads clear of the edge of this bank between those islands and Tanjong Tadah.

From Tanjong Tadah the bank still follows a westerly direction till South of Tanjong Puni, when it trends away sharply to the north-westward, following the curve of the coast line at an average distance of about 1¼ miles until abreast the east point of Mintok bay, from which it is distant only half a mile.

Between Tanjong Tedong and Tanjong Tadah, the soundings decrease regularly towards the bank, which may there be approached to 5 or even 4 fathoms, except near Meddang islands, where a vessel should not shoal under 5 fathoms. At Tanjong Tadah the bank begins to get steeper to,

* Seaman's guide round Java, page 268.

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and abreast of Karang Sarabu rocks, there are 9 and 10 fathoms close to its edge.

Caution.—The bank south of Tanjong Puni is very shallow and steep-to, having from 11 to 16 fathoms, almost close to its edge. Tanjong Tadah bearing E. by N. ¾ N. just leads clear to the eastward of this dangerous spit, and Monopin hill N.W. by N. leads just clear to the westward.

KARANG BROM-BROM is an extensive shoal of rocks and sand, dry in some places at low water, lying 4½ miles South from the shore between Tanjongs Puni and Sukal. It is a little more than 2 miles long in a W. ½ N. and opposite direction, and nearly half a mile wide at its western end, where the rocks are, and from which Monopin hill bears a N.W. ½ N.; the eastern end tapers away to a sandy point.

On the south side of Karang Brom-Brom lies a red beacon buoy, in 5 fathoms, with Monopin hill bearing N.W. ½ N.; and Tanjong Tadah, N.E. ½ E.

The highest part of the hummock on the point behind Karang Sarabu rocks bearing N. ¼ E.; or the highest part of Tanjong Tadah bearing N.E. ¾ N., clears the eastern end more than half a mile; and Bukit Beloe, bearing N. ¾ W., clears the western end nearly a mile.

A Channel 2 miles wide, having 7 to 15 fathoms water in it, lies between Karang Brom-Brom and the shore bank.

With reference to this channel, the Java Guide observes: "Notwithstanding that the channel between Karang Brom-Brom and Banka is only 2 miles wide, a vessel may easily work through it by day, during the western monsoon, because she can take advantage of the tides; but on the coast of Sumatra, a strong easterly current runs with little interruption; she must, however, be very careful in crossing over to the coast of Banka, as the bank is very steep, and she might suddenly fall from 7 to 3 fathoms before there would be time for a second cast of the lead."

AMELIA BANK is a small patch of hard ground, with 2¾ fathoms water over it, at the south-east extreme of Mintok bank; it is connected to the shoal patches of Mintok bank by a ridge having 4 and 5 fathoms water. From Amelia bank the western extreme of Karang Brom-Brom bears East 4½ miles, and Monopin hill N. by W. ¾ W., 12 miles.

Bukit Beloe bearing N. ½ E., leads a mile to the eastward of Amelia bank; and the same hill N. by E. ½ E., leads the same distance to the westward. The dry rocks of Karang Brom-Brom bearing E. by N. ¼ N., clears the south side of the bank, which should not be approached under a depth of 10 fathoms.

MINTOK BANK extends from Amelia bank in a direction nearly parallel to the shore, for a distance of 10 or 11 miles, to within about a

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third of a mile of Karang Hadji, off Tanjong Kalian. It is composed of hard sand, and has several patches with only 2½ and 3 fathoms water over them, and 4 or 5 fathoms between.

A 2-fathoms patch lies N.W. by N. 2¼ miles from Amelia bank: Bukit Beloe, bearing N. by E. ½ E. which leads to the westward of Amelia bank also leads to the eastward of this patch.

From this last-mentioned patch, other patches of 2½ and 3 fathoms extend N.W. by W. for 5 miles, this part of the bank being about 1½ mile wide. For 2¾ miles farther in the same direction the bank has from 4½ to 7 fathoms water over it, the deepest water appearing to be with Mintok fort flagstaff in line with the pier head, bearing about N. by E. ½ E.

Another 3-fathoms patch lies with the lighthouse on Tanjong Kalian bearing N. ½ E., 1⅓ miles; from which 5 fathoms may be obtained towards Karang Hadji until very close to it, when the water will suddenly deepen to 11, 17, or 20 fathoms. Monopin hill in line with the lighthouse on Tanjong Kalian, N.E. ½ N., leads westward of the 3-fathoms patch, between it and Karang Hadji.

Working through the strait, to keep clear of Mintok bank, care should be taken not to bring the lighthouse on Tanjong Kalian to the westward of N.W. by N.

KARANG HADJI is a dangerous reef of rocks and sand lying close to the north-west end of the Mintok bank; the rocks on it are all covered at high water, but many of them are visible at half tide. The reef is 1½ miles long N.W. by W. and S.E. by E., and half a mile broad, and from its western and outer extreme, Tanjong Kalian lighthouse bears E. ¾ N. 2¼ miles, and Tanjong Oelar is in line with Tanjong Bersiap; its eastern extreme bears S.W. by W. ¼ W. 1½ miles from Tanjong Kalian. Close to it on the north, west, and south sides, the depths are irregular from 16 to 21 fathoms.

Tanjong Oelar kept well open of Tanjong Bersiap clears the west end of this reef; the highest part of Monopin hill in line with the lighthouse, clears it eastern extreme; and Tanjong Puni bearing E. ¾ S., leads to the southward.

On the north-west edge of Karang Hadji lies a red beacon buoy in 4½ fathoms, with Tanjong Kalian bearing E. ¼ N.; and Bersiap hill N.N.E. ¼ E.

A rock, with 12 feet water on it, lies about 2 cables to the northward of Karang Hadji, with Tanjong Bersiap, bearing N. ¾ E., and lighthouse on Tanjong Kalian E. ¼ N.

BINNEN BANK, of hard sand, with 2½ fathoms water and 7 or 8 fathoms close-to, extends East 1¾ miles from Tanjong Kalian, receding thence to the north-west for about half a mile; it forms a spit project-

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ing to the eastward; it then curves into the sand-bank which extends half a mile from the shore of Mintok.

Two-thirds of a mile E. by S. from this spit is a 3-fathoms patch, from which Mintok pier-head bears N.N.W. ¾ W., distant two-thirds of a mile, and Tanjong Kalian lighthouse West-northerly.

TANJONG KALIAN and Light.—Tanjong Kalian, low and sandy, with some trees behind it, is the south-western extreme of the west end of Banka. The lighthouse upon it, is a white stone tower with a red lantern, which shows, at an elevation of 170 feet, a *fixed* white light, visible in clear weather from a distance of 20 miles.

About three-quarters of a mile north-west from the lighthouse is Tanjong Batu-brani, the trees immediately behind which, are 127 feet high.

KALIAN LEDGE is a small reef, with 6 to 9 feet water, lying a little more than a mile to the north-west of Tanjong Kalian; from it the lighthouse bears S.E. by E., Tanjong Bersiap N. ¼ W., and Monopin hill N.E. ¼ E.

KALIAN PASS, formed by Tanjong Kalian and ledge on one side, and Karang Hadji on the other, is three-quarters of a mile wide, with soundings of 25 to 32 fathoms. This channel is generally used by vessels coming from the northward and proceeding to Mintok bay, and with a fair wind is preferable to the passage outside Karang Hadji; but the great depth, bad anchorage, and strong currents, render it unadvisable to attempt to work through.

In using this channel the sandy point upon which the lighthouse stands may be passed tolerably close to; and the lighthouse bearing E. by S., leads through between Kalian ledge and Karang Hadji.

MINTOK TOWN and ROAD.—Two miles E.N.E. from Tanjong Kalian on the banks of a small river is the town of Mintok, the capital of the island, having a fort upon a hill, and some stone houses close to the shore, the red roofs of which are visible at a considerable distance. The Resident and other Dutch officers have houses on the hill near the fort, most of the native houses being nearer the sea. The mail steam vessels which run twice a month between Batavia and Singapore, always call here.

Pier and Light.—A pier nearly half a mile long, and extending out to the edge of the bank, has been built, and is of great advantage to the trade of the place; on the extremity of the pier a small *fixed* white light, 29 feet above high water, is shown all night, and should be seen in clear weather from a distance of 8 miles.

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Anchorage.—The best anchorage for large vessels is in 10 to 6 fathoms, about $1\frac{3}{4}$ miles from the shore, with Monopin hill bearing about N. $\frac{3}{4}$ E., and Tanjong Kalian about W.N.W. or W. by N. The ordinary anchorage of the Dutch man-of-war stationed in Banka strait, and of the merchant vessels trading to Mintok, which are usually of a small class, is in $4\frac{1}{2}$ or 5 fathoms inside the 3-fathoms patch lying off the spit which extends from Binnen bank, at any convenient distance and direction from the pier-head.

Directions.—The usual route to Mintok road is across Mintok bank, between Karang Hadji and Amelia bank. A vessel coming from the northward and bound for the road, may proceed either through the Kalian pass, or she may pass outside Karang Hadji and then follow the usual track across Mintok bank. A good mark for crossing the bank is Monopin hill in line with the flagstaff on the fort bearing N. by E. $\frac{1}{2}$ E., which will lead over it in 5 or 6 fathoms water; another good mark is Monopin hill in line with the lighthouse N.E. $\frac{1}{2}$ N. No vessel can cross the bank in safety with Monopin hill bearing to the westward of North; with the hill bearing North, a vessel crossing the bank would have 3 fathoms at low-water spring tides, the bottom hard sand, coral, and shells. When over the bank, the water will deepen to 18 or 20 fathoms, soft muddy bottom, and shoal again quickly towards the inner bank and the shore.

With a working wind keep Monopin hill between N. $\frac{1}{2}$ E. and N.N.E.

To enter Mintok road from the eastward, a vessel must work between the shore and Mintok bank, being careful not to bring Tanjong Tadah to the eastward of E. by N. $\frac{3}{4}$ N., until Monopin hill bears N.W. by N.

A hard sandy bottom and shoal water will show when near the edge of Mintok bank; while, to avoid the shallow along the coast, Monopin hill must not be brought more to the westward than N.W. by N., and taking care not to shoal to less than 5 fathoms.

Tides.—It is high water, full and change, at Tanjong Kalian, in he north-west monsoon at 8h. 17m. a.m., and in the south-east monsoon at 8 p.m.; springs rise $12\frac{1}{2}$ feet.

TANJONG BERSIAP, 168 feet high, bears from Tanjong Batubrani, the north-western extreme of Tanjong Kalian, N. by W. $\frac{1}{2}$ W., distant $3\frac{1}{2}$ miles. The coast between curves a little to the eastward, and is fronted by a bank extending nearly a mile from it, tolerably close to which are 7 and 10 fathoms. Inside the edge of this bank, and lying some distance off Tanjong Bersiap, is a cluster of rocks, some of which are above and others below water.

Bersiap Hill, 336 feet high, is small, and stands by itself, about $1\frac{1}{2}$ miles north-east of the point. At 2 miles north-east of the hill, the

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extreme of a range which extends from Monopin to the north-west forms a conspicuous peak 709 feet high.

TANJONG OELAR, 156 feet high, is about 4 miles N. by E. from Tanjong Bersiap, the coast between forming a bay about a mile deep, in which are two or three points with small bays between them ; nearly in the centre of it is a remarkable yellow cliff.

Water.—About three-quarters of a mile northward of the yellow cliff, and just to the south of a point with a rock off it, is a stream of water.

OELAR REEFS is the name given to the rocky and uneven ground, with reefs and rocks above water in places, extending off shore between Tanjong Bersiap and Tanjong Oelar. From a mile off Tanjong Bersiap, it lies in a N. by W. direction for nearly 3 miles, when it trends to the north-eastward, passing about three-quarters of a mile outside Tanjong Oelar, immediately off which are several rocks above water.

Transit rock, on which H.M.S. *Transit* was wrecked, 10th July 1857, lies at the western extremity of this rocky uneven ground, at $2\frac{1}{4}$ miles off shore, and W. $\frac{1}{4}$ N. 8 cables from a reef which generally shows, except at high tides, with 6 and 10 fathoms between them. The least depth on the rock at low-water springs is 12 feet, and from this point Tanjong Oelar bears N.E. by E. ; the highest point of Monopin range E. by S. $\frac{3}{4}$ S. ; and Tanjong Kalian is $1\frac{3}{4}°$ open of Tanjong Bersiap S.S.E.-southerly, distant from the latter point $2\frac{3}{4}$ miles. There are 20 fathoms water at a cable to the westward of the 12 feet ; the depths around varying from 14 to 12, 7, and 5 fathoms over very uneven bottom.

A rock awash, at low-water springs, lies E. $\frac{1}{2}$ N. 2 cables from Transit rock ; and there are $4\frac{1}{2}$ fathoms (perhaps less) rocky bottom, at half a mile to the northward of Transit rock, with 20 fathoms close-to ; the locality of the latter is indicated by strong ripples.

Tanjong Batu-brani well open of Tanjong Bersiap, bearing S.S.E. $\frac{1}{2}$ E., leads to the westward of Transit rock ; and Tanjong Biat, well open of Tanjong Oelar, bearing E.N.E., leads to the northward.

TANJONG BIAT bears N.E. $\frac{3}{4}$ E. distant 3 miles from Tanjong Oelar, and, like that point and Tanjong Bersiap, has rocks above and below water, extending some distance off it.

The line of danger which extends about three-quarters of a mile off Tanjong Oelar, follows the curve of the coast line at about the same distance towards Tanjong Biat, where it projects rather farther off.

Water.—In the bay between Tanjong Oelar and Tanjong Biat is a small stream of water with a village close to it.

ROCKY PATCHES, with 20 fathoms close to them, lie off Tanjong Biat, having a narrow channel with 10 and 11 fathoms water

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between them and the rocky ground extending from the coast. From the outer patch of 3 fathoms, Tanjong Oelar bears S. ½ W. 3 miles, and Tanjong Biat S.E. by E., a little over 2 miles.

Tanjong Oelar bearing South, leads nearly half a mile westward of these dangers; and Bukit Batoe, a hill 708 feet high, about 12 miles eastward of Tanjong Biat, bearing E. by S., leads northward of them.

Caution.—The west coast of Banka, between Tanjong Kalian and Tanjong Biat, is very dangerous to approach, owing to the rocky patches just described and the deep water close to them; great caution is therefore necessary when in this vicinity, observing that Tanjong Bersiap, if not brought to the westward of South, will clear all the dangers between Tanjong Oelar and Biat; and they should be careful to regard the marks given to clear Transit rock.

FREDERICK HENDRICK ROCKS lie at the northern entrance of Banka strait, nearly midway between Batakarang point on the Sumatra coast and Tanjong Oelar on the Banka coast. They consist of two rocky patches, lying north and south of each other, having only 9 feet on the northern patch, and 3 feet on the southern. The two patches occupy a space about a mile long, north and south, and half a mile broad. *Light-vessel, said to be preparing.*

From the 3-feet patch Monopin hill bears nearly E. by S. 14 miles; and the lighthouse on Tanjong Kalian S.E. by E. ¼ E. 12¾ miles.

Monopin hill, E. ¾ S., leads about half a mile southward of the 3-feet patch; and Monopin hill in line with the remarkable yellow cliff between Bersiap and Oelar points, E. by S. ¾ S., leads 2 miles northward of the northern patch.

Close around the shoal are 16 to 20 fathoms water.

Buoy.—A red buoy, surmounted with a staff, and the letters F.H. on a vane, is moored in 5 fathoms on the south edge of the 3-feet patch, with Bersiap hill bearing E. by S., Tanjong Kalian lighthouse S.E. by E. ⅛ E., and Gunong Paree N.E. by E.; but as the buoy from the strong tides frequently shifts its position, vessels are cautioned not to place too much dependence on it.

Caution.—The buoys and beacons in Banka strait are not to be depended upon.

Channels.—The channel westward of Frederick Hendrick rocks is the one most generally used, the depths in it being moderate, decreasing regularly towards the bank extending from the Sumatra coast; whereas in the channel eastward of the rocks, the water is much deeper and the depths irregular.

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Between the rocks and the 3-fathoms line at the edge of the mud-bank extending from Batakarang point, the channel is 4½ miles wide, having 16 and 17 fathoms close outside the 10-fathoms line towards the rocks; the depths under 10 fathoms decreasing regularly towards the bank.

The channel between Frederick Hendrick, and Transit rocks and reefs off the west coast of Banka is 8 miles wide, having 16 to 20 fathoms at 3 or 4 miles eastward of Frederick Hendrick rocks, and 19 to 25 near Banka, which depths increase to 24 and 30 fathoms close to the dangers extending from that coast.

Directions for West Channel.—To avoid Frederick Hendrick rocks, vessels taking the channel between them and Sumatra should keep in 4½ to 7 fathoms water on the edge of the bank off Batakarang point, and not keep more to the eastward than in 9 or 10 fathoms, while Monopin hill bears between East and E.S.E.

In working through this channel a vessel should not deepen to more than 9 fathoms towards Frederick Hendrick rocks, but the bank off Batakarang point may be neared to 5 or 4½ fathoms. When Monopin hill bears E.S.E. the vessel will be northward of the rocks.

In the East Channel Gunong Punyabung, Paree, and Jerankat, on the north-west part of Banka, will appear like islands (page 246). To pass eastward of Frederick Hendrick rocks, keep Gunong Punyabung N.E., until Monopin hill bears E. ½ S., when Gunong Punyabung must not be more eastward than N.E.; and when Monopin is E. by S. ½ S., Gunong Punyabung must not be more north than N.E. ¼ N., so as to avoid in the first case Frederick Hendrick rocks, and in the second Transit rock. When Monopin bears southward of S.E., Gunong Punyabung must not be brought to the northward of N.E.—*see* also page 243.

Soundings in Banka Strait.—The soundings in Stanton and Lucipara channels are given in pages 233 and 239. In Banka strait between Lalarie and Second points the depths are from 17 to 25 fathoms, shoaling suddenly from those depths to 10 fathoms on the Banka side of the strait, but decreasing regularly towards the 10-fathoms line on the Sumatra side.

In the middle of the strait, close to the northward of the rocky banks lying north-westward of Timbaga rocks, are irregular soundings from 18 to 26 fathoms; and thence towards Nangka islands the depths are 15 to 19 fathoms.

An irregular shaped bank, 6 miles long, N.W. and S.E., and but three-quarters of a mile broad, with 9 and 10 fathoms water over it, lies nearly in the middle of the strait; from its south-east end the summit of Great Nangka bears N. ½ W., distant 6¾ miles, and from its north-west end

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the summit bears N.E. ¼ E., 5 miles. Close to this bank on all sides are 12 to 14 fathoms, except on the western edge of the north-western extreme, where the depth is 19 fathoms.

A small patch of 9 fathoms, with 12 to 14 fathoms round it, lies about 2 miles south-eastward of the above-mentioned bank, about half a mile from the 10-fathoms line off the coast of Banka.

Westward of Nangka islands, in the fairway of the strait, is an irregularly formed bank of coral, having 8 to 10 fathoms water over it, and 11 to 13 fathoms on both sides of it, which at the distance of a mile N.N.W. from the long 9-fathoms bank before described, forms a sort of elbow, with a narrow spit projecting about a mile from it, in the direction of Middle Nangka island. Northward of Nangka islands this bank merges into the bank extending from the coast, the 10-fathoms line bounding both, curving away from the parallel of West Nangka island to the north-westward, and rounding Third point at a distance of about 4 miles. Midway between the elbow and the 10-fathoms line off the Sumatra coast the depth is 18 fathoms, decreasing irregularly to 11 and 14 fathoms till abreast of Third point.

Between Third point and the two banks lying to the north-eastward of Fourth point, one of which has 5, and the other 6 fathoms water over it, the soundings vary from 9 to 14 fathoms; thence to Frederick Hendrick rocks, the soundings are also very irregular, varying from 7 to 18 fathoms. This variation in the soundings is caused by several long narrow sand-banks, the position and character of which will be much easier understood by reference to the chart which these directions are intended to accompany than by any description possible to be given here. Indeed, throughout the strait, the soundings cannot alone be relied upon to conduct a vessel safely through; but when associated with careful bearings and frequent references to the chart, a stranger need not run the least risk, or experience any difficulty in passing through the strait for the first time.

STANTON AND LUCIPARA CHANNELS.

STANTON CHANNEL,* lying along the south-western coast of Banka, is 19 miles long, and nearly 3 miles wide at its narrowest part, with depths, mid-channel, increasing gradually from 7 fathoms at its south-eastern entrance to 20 fathoms near the other extreme. The approaches to it from the southward are marked by the well-defined moun-

* *See* Admiralty chart of Banka strait, South entrance, No. 2,808, scale, $m = 0{\cdot}7$ of an inch.

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tain of St. Paul, and the conical hills of Gadong and Toboe Ali Lama (page 217), and in fine clear weather by the more distant range of Padang, 2,217 feet high; these cannot fail to point out the entrance, and the water being deep within half a mile of Dapur islands (page 215), will give strangers confidence in steering for the land. Prominent points and hills will also be seen along the Banka coast, bearings of which will enable a vessel at any time to ascertain her position.

The channel is bounded by narrow banks extending in a N.W. by W. and S.E. by E. direction, and all partaking of the same formation (sand) in their shoalest parts, with a mixture of mud and sand between. The two marking the western boundary of the channel are named Smits and Melvill banks, after the late Lieutenants Smits and Melvill of the Dutch Royal Navy, whose valuable contributions to hydrography in the Java sea are so well known to seamen.

Smits Bank consists of four smaller banks, nearly connected, and forming one long narrow ridge 15 miles in length, with its shoalest part of 3 feet, lying 6 miles, and the next shoalest of 9 feet, 3 miles from the north-western end; two other patches of 3 fathoms and 2¾ fathoms lie on the south-east part of the bank.

Panjang hill, bearing N.E., leads to the north-eastward of this bank, between it and the Nemesis bank, in 6 fathoms at low water. Gadong peak in line with Toboe Ali point N.E. ¼ E., or Lucipara island S.W., clears the south-eastern end in 4 fathoms; and Lalarie point N.W. by W. ¼ W., or not approaching the bank to a less depth than 10 fathoms, clears the north-eastern side. *Light proposed.*

Melvill Bank, 5 miles long, and nearly half a mile broad, lies a quarter of a mile to the eastward of the south-eastern part of Smits bank, with a depth of 7 and 8 fathoms between. The shoalest part of this bank is near its north-western extremity, and is about 2 miles in length, with 2 to 3 fathoms on it. At the north end, in 5 fathoms, Laboh point bears N.E. by E.; and the bank will be cleared on its south-east side in 7 fathoms by the latter point bearing N. by E. ½ E.; and on the east side in 8 fathoms, by not bringing Parmassang peak more open to the westward of Banka hill than N.W. ¾ N.

Between the above banks and Lucipara island, there are many others all trending in the same direction, with narrow deep water channels between; but as these channels are exceedingly narrow, and no marks can be given to clear the banks, they are not available for vessels.

Eastern Bank.—The bank bounding the eastern side of Stanton channel is 13 miles long and nearly a mile wide, at 3 miles S.W. by S. of Laboh point, which is the broadest and shoalest part. It is formed by

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three smaller banks nearly joined together, with 2 to 3 fathoms on the north-western and south-eastern banks, and only 4½ feet on the middle of the centre bank. The north-western extremity is separated from a projecting horn, extending from the shore mud-flat at 2 miles S.S.W. of Pulo Dahun, by a narrow channel having of 6 fathoms water.

Gadong peak, in line with Tobóe Ali fort, bearing N.E. ½ N., leads to the southward of the south-eastern part of the bank in 4½ fathoms; Dapur island S.E. by E. ¾ E. leads to the westward; and Mamelon Hummock kept open to the westward of Pulo Besar, N.W., clears the west side of the north-western extremity of the above banks.

A small bank of sand lies one mile to the westward of the south-eastern extreme of the Eastern bank, but as not less than 4½ fathoms were found on it at low water it is not dangerous to vessels passing through.

Commander W. Chimmo, 1870, states that Mamelon Hummock could not be distinguished from the *Nassau* until near Lalarie point, and the leading mark for Stanton channel is not easily recognised.

Inner Channel.—To the eastward of the Eastern bank along the coast of Banka, there is an inner channel nearly a mile wide, with 4 to 6 fathoms water, but being encumbered with shoals it is only navigable for small vessels. Dapur island bearing S.E. by E. leads nearly in mid-channel.

There are also two outlets into the main channel over the Eastern bank, in 5 and 4 fathoms; Pulo Dahun bearing N.N.E. leads through the 5 fathoms outlet; and Pulo Puni and Gossong point in line, E. ½ N. leads through the 4 fathoms outlet.

Nemesis Bank, lying nearly mid-channel between Pudi point and False First point, is a long ridge of sand extending 9 miles in a N.W. by W. and S.E. by E. direction, with irregular soundings of 3 to 10 fathoms on it. The shoalest part consists of two patches of 3 fathoms, each about 2 cables in extent, upon one of which the French frigate *Nemesis* grounded in 1857. They lie E.S.E. and W.N.W. from each other, distant half a mile, and from the western patch Lalarie point bears N.N.W. ¾ W. 4¾ miles, and False First point S.S.W. ¾ W. 4¼ miles.

Casuarina point kept open of Lalarie point bearing N. by W. ¾ W. leads to the westward of these shoal patches, in 14 fathoms water; Mamelon Hummock N. by E. ¼ E., or False First point S.W. ½ S., leads to the eastward; and Lalarie point bearing N.W. ½ N. leads to the northward. There is another patch of 5 fathoms lying 2 miles from the south-eastern extreme of the bank, with False First point W. ¼ S., and First point S. by W. ¼ W., distant 3¼ miles.

Anchorage may be found in any part of Stanton channel, but vessels bringing up with their kedge or stream anchor must always be

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prepared to let go the bower anchor, as there will be experienced, particularly during the change of the monsoons, very dangerous squalls, with heavy rain, thunder, and lightning, which generally lasts for about an hour.

Tides.—In the south-east monsoon it is high water, full and change, at Tobóe Ali point, on the Banka shore, at 8h. 30m. p.m., and at 10 a.m. in the north-west monsoon; ordinary springs rise 10¾ feet, and sometimes 12 feet. The highest tide generally occurs two days after full and change. The rate at springs is 2½ knots. The flood stream sets to the N.W. and runs for about 12 hours, and the ebb the same period in the opposite direction, but they are both sometimes influenced by the strength of the monsoon. When it is blowing strong from the S.E. the flood stream often runs for 14 hours.

It is high water, full and change, at Laboh point at 11h. p.m. in the south-east monsoon; ordinary springs rise 10 feet.

After rounding Lalarie point in the south-east monsoon the flood sets N.N.W., and the ebb to the S.S.E., along the Banka shore.

The time of high water at Laboh point being 2½ hours later than at Tobóe Ali point, in the southern part of Stanton channel, for a few days after full and change the tides will be found, (as there is generally 12 hours flow and ebb,) to run in one direction all night, and the opposite direction during the day, with a velocity of 2½ to 3 knots. The current also setting directly mid-channel, the flood N.W. by W., and the ebb S.E. by E., vessels may take advantage of it in light airs to drop through.

Directions for STANTON CHANNEL from the southward.—Vessels from the southward intending to proceed into Banka strait by Stanton channel cannot fail, in approaching the coast of Banka, to recognise mount St. Paul (page 217) by its flattish top having several nipples of nearly the same elevation, and Gadong and Tobóe Ali Lama peaks by their conical appearance, Should the weather be clear, the distant high range of Padang will be visible. The highest peak of this range is quoin-shaped, attaining from its western shoulder an elevation of 2,217 feet, with several lower hills of a rounder and more conical appearance adjoining, the two westernmost being about 1,200 and 1,400 feet high.

After recognising mount St. Paul and Tobóe Ali Lama peak, approach the latter on a North bearing, and when about 3 miles to the southward of the Dapur islands steer N.W. by W., which will lead nearly mid-channel to abreast Banka point: recollecting the marks given at pages 234 and 235, for clearing the Melvill and Eastern bank.

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When off Laboh point, the high range of Parmassang will be visible rising from a gradual slope on its western shoulder to a flat-top peak, with two lower peaks adjoining. The three hills, Banka, Panjang, and Woody, will also be seen ; the two former may be known by their wedge shape and the latter by its isolated position.

From abreast Banka point a course may be shaped along the Banka shore, passing Lalarie point at a distance not within $1\frac{1}{2}$ miles, as the tides are strong and set towards the point, and thence to Second point. When Pulo Dahun bears North, great care must be taken to avoid the spit which extends in a south-easterly direction from the shore mud-flat, between the above island and Banka point. The Mamelon Hummock, well open to the westward of Pulo Besar, bearing N.W., clears this spit (page 235) ; thence to Timbaga rocks the bank may be avoided by not shoaling towards it under a depth of 10 fathoms.

Working through this channel from the eastward, vessels may stand towards the south extreme of the Dapur islands to a distance of half a mile, as these islands have deep water at 4 cables from them. Between this and Tobóe Ali the shore mud-flat may be approached until Pulo Dapur bears S.E. by E. $\frac{1}{2}$ E., and Lucipara island may be neared to a distance of 5 miles; but when Gadong peak bears N.E. $\frac{1}{2}$ N., or comes in line with Tobóe Ali fort, Pulo Dapur must not be brought to the southward of S.E. by E. $\frac{3}{4}$ E. to clear the south-eastern part of the Eastern bank.

Avoiding to bring Parmassang peak more open to the westward of Banka hill than to bear N.W. $\frac{3}{4}$ N., will clear the Melvill bank, and when Laboh point bears N.E. $\frac{1}{2}$ N., by not shoaling under 10 fathoms, all the banks on both sides will be cleared. Lalarie point N.W. by W. $\frac{1}{4}$ W., will also clear the north-eastern part of Smits bank.

The shoal patches on the Nemesis bank should not be approached under a depth of 10 fathoms until Casuarina point comes open of Lalarie point, and in rounding the latter point take care not to come into a less depth than 10 fathoms, as the bank is here steep-to. Timbaga rocks may also be avoided by following the same precaution, and from thence it is recommended to work up from Second point along the Sumatra coast.

From the westward.—Proceeding through Stanton channel from the westward, when abreast and $1\frac{1}{2}$ miles distant from Lalarie point, an E.S.E. course will lead nearly mid-channel between Nemesis bank and the bank extending from the Banka shore, but when Panjang hill bears N.E. a more southerly course must be shaped to pass in mid-channel. When Dahun point bears North, Mamelon Hummock open

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of Pulo Besar N.W., the clearing mark for the spit off Pulo Dahun, also leads directly through the channel.

Working through from the westward in the south-east monsoon, the same precaution must be taken as already mentioned to avoid the shoalest part of Nemesis bank, which will be passed when Mamelon Hummock bears N. by E. ¼ E.; and should a strong flood tide be then running it would be advisable to anchor in 8 or 9 fathoms, sand, on Nemesis bank, as the water on both sides of it is deep, and wait for a change of tide, or the chance of the land breeze, which blows generally either during the night or early in the morning from the Banka shore. When Panjang hill bears N.E., Lalarie point must not be brought to the northward of N.W. by W. ¼ W. to avoid Smits bank, and the same directions as already given in not approaching the banks under 10 fathoms until Laboh point bears N.E. ½ N. (page 237), will be quite sufficient to enable any vessel to work through.

LUCIPARA CHANNEL.—The south entrance to this channel is between Lucipara island and Lucipara point, nearly West, 9 miles distant from it. The western side of the channel (page 207) is bounded by the mud-flat which projects from the coast of Sumatra for 2 miles and more, and its eastern side, by various hard and dangerous sand-banks, which narrow the breadth of the passage to 1½ and 2 miles.

In 1860 Mr. Stanton was of opinion that this channel would, within a few years, become unnavigable for vessels of large draft, owing to the rapid extension of the mud-flat projecting from the Sumatra coast on the western side, and to the extension, also, of the sand-banks on the eastern side.

Round Shoal.—The southern sand-bank in this channel is nearly 2 miles long W.N.W. and E.S.E., and about a mile broad, the least water, 1½ fathoms, being near the middle of it. From its southern edge in 3 fathoms the summit of Lucipara island bears S.E. ⅛ E. 7¼ miles, and from the western edge S.E. ½ E. 9 miles; and bearing S.E. by E., leads nearly three-quarters of a mile westward of it.

The narrowest part of Lucipara channel is between the western extreme of this bank, which forms a kind of elbow, and the mud-flat extending from the Sumatra coast.

Lucipara Light-Vessel, lies in 3 fathoms about 3½ cables, north-westward of the north-west end of Round shoal, on the eastern side of Lucipara channel, and exhibits at 28 feet above the sea a fixed white light, visible in clear weather from a distance of 10 miles. The vessel is painted black, with the word "Lucipara" painted on her sides in white letters, has one mast, and carries a red ball at the mast head.

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Hindostan Bank extends from close to the eastern edge of Round shoal N.N.W. ½ W. about 3½ miles. The depths on the southern and middle parts of it are one to 3 fathoms, but about three-quarters of a mile from its northern extreme is a patch of hard sand with only 3 feet water over it. From the western edge of the bank, which is distant nearly a mile S. by W., from its northern extreme, Green point bears W.N.W. 3 miles, and First point N.W. by N. 6 miles.

Merapie Shoal, the most northern of the banks on the eastern side of Lucipara channel, is composed, like the others, of hard sand, and is three-quarters of a mile in extent north and south, and more than half a mile broad. The least water on it is 2¼ fathoms, and from its western edge First point bears W. by N. ¾ N. nearly 2¾ miles, and Green point S.S.W. ¾ W. 3¾ miles. From the middle of the shoal, False First point is in line with First point.

Soundings.—A few miles southward of the entrance of Lucipara channel the depths are 4½ to 5 fathoms, deepening to the south-eastward of Lucipara. In mid-channel at the entrance there are 5 to 6 fathoms deepening a little towards the island, but shoaling gradually towards the Sumatra flat. About the same depths will be obtained as far as the light-vessel off the north-west end of Round shoal, when the soundings begin to deepen to 7 fathoms, and a little farther on to 8 fathoms. Between Merapie shoal and the Sumatra flat are from 9 to 12 fathoms, deepening to 14 or 16 fathoms towards First point, but shoaling to 8 or 10 fathoms more to the eastward, about 2 miles distant from the point.

In Lucipara channel the bottom is generally hard sand on the banks towards the eastern side, and soft mud on the western or Sumatra side; yet close to the north-western edge of Hindostan bank, the bottom is also soft, with 5½ and 6 fathoms; it is therefore advisable not to keep in too soft bottom, but in the middle of the channel.*

Directions for Lucipara Channel from the southward.—When bound towards Banka strait from the southward Lucipara island is generally made between the bearings of N. by E. and N.W., and in 5½ to 8 or 9 fathoms; but should it, when first seen, have a more westerly bearing, run to the westward till it bears North 4 or 5 miles; and then, by steering N.W., the vessel will pass between it and Lucipara point. With westerly winds it is advisable to keep on the western side of the channel in 4¾ to 5½ fathoms. The depth towards Lucipara increases to 6 and 7 fathoms when the island bears between E.N.E. and S.E. by E., and between those bearings it may be approached as near as 1½ miles.

* Seaman's guide round Java, page 252.

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In clear weather, when the Parmassang range is visible, the highest peak on the western extreme of the range in line with First point, N. by W. ½ W., will lead into Lucipara channel, not quite three-quarters of a mile outside the 3-fathoms edge of the mud-bank projecting from Lucipara point. Formerly this mark led through the middle of the channel, but owing to the mud-bank having become of late years considerably more extended, it no longer answers that purpose. Therefore this mark should be left when Lucipara island bears about E.S.E. or S.E. by E.; then, by keeping Mamelon Hummock (page 219) on a N. ¾ W. bearing, it will lead through between the bank off First point and Merapie shoal, until Lalarie point is seen well open of First point, when a vessel may begin to edge away to the westward to round First point, taking care not to approach it nearer than a mile, as the bank projecting from the point is steep-to, especially on its north-east side. After rounding First point at not less than that distance, a N.W. ½ W. course will lead midway between False First point and Nemesis bank.

A vessel entering this channel with Parmassang peak in line with First point, N. by W. ½ W., will have about 4 fathoms at low water, with an occasional cast of 4¼ or 4½ fathoms perhaps until Lucipara island bears E. by S. ½ S., when the soundings will deepen to 4¾ and 5 fathoms, and shortly afterwards to 5½ and 6 fathoms, till abreast the light-vessel off Round shoal; thence 6, 7, and 8 fathoms until nearly abreast Merapie shoal, when the water will suddenly deepen to 11 or 12 fathoms. If, from the haziness of the weather, Parmassang peak cannot be seen, keep midway between Lucipara island and the coast, taking care not to bring the island to bear S.E. ¾ E., before First point bears N. by W. ½ W., or Mamelon Hummock N. ¾ W.

From the northward.—Entering Lucipara channel from the northward, First point must be rounded with great caution, on account of its being steep-to, especially on its north-eastern side, and it must not be approached nearer than a mile; at the same time, if the tide is running to the south-eastward, it will be necessary to use proper care that, in giving a safe berth to First point, the vessel is not set too near Merapie shoal which the tide will be likely to do unless guarded against. When Mamelon Hummock bears N. ¾ W., steer for it on that bearing until Lucipara island bears S.E. by E. or E.S.E., when Parmassang peak may be brought in line with First point, N. by W. ½ W., which will lead clear of the Sumatra bank; or a S.E. by S. course may be steered, which will lead midway between Lucipara island and the main.

Working through this channel a vessel may stand towards the Sumatra bank safely by attending carefully to the the lead; by not going into less than 6½ fathoms when near the elbow projecting just to the south-

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ward of Green point. Lucipara island must not be approached nearer than 2 miles, when bearing to the northward of N.E. by E.; between the bearings of N.E. by E. and E. by S. it may be approached to a mile.

Careful attention to the lead and a good look-out, will also give sufficient warning when standing towards the banks on the eastern side.

Caution.—Many vessels passing through Lucipara channel have grounded on the mud-flat extending from the coast of Sumatra, especially a short distance to the Southward of Green point, where the flat extends farther out, and all have been obliged, before they could get off, either to tranship or to throw a part of the cargo overboard, as the anchors which were laid out on the soft muddy bottom to heave them off came home. This part of the flat shoals suddenly from 6 to 3 fathoms, and therefore should never be approached to a less depth than 6½ fathoms.

It will also be necessary to use great caution when working through this channel from the southward and standing to the eastward, to avoid being set on the banks by the tides, which sweep over them with great strength, and would soon carry a vessel into danger, if due allowance be not made. This is very likely to happen when to the southward of Round shoal, and standing to the eastward. Lucipara island bearing S.E. by E., leads nearly a mile to the southward of Round shoal.

In working through this channel from the northward similar caution is required. With light winds it is very difficult to get into the northern entrance, the tides sweeping vessels away to the south-eastward amongst the banks.

Directions from Lalarie Point through Banka Strait.—Having passed through either Stanton or Lucipara channels, and brought Lalarie point to bear about East, distant 3 miles, a N.N.W. ¾ W. course for about 10 miles will lead midway between the rocky bank of 7 or 8 fathoms water, lying north-westward of the Timbaga rocks, and the mud-bank projecting from Second point, and in this track the soundings will be from 20 to 22 fathoms water, with an occasional cast 2 or 3 fathoms deeper. Continuing the same course for 6 or 7 miles farther, the water will have shoaled gradually to 10 or perhaps 6 fathoms, and the vessel will then be 1½ to 1¾ miles outside the horn or spit projecting from the Sumatra flat (page 208). Still continuing the same course for another 5 or 6 miles in from 6 to 10 fathoms, the soundings will soon deepen to 11 and 14 fathoms; 13 or 14 fathoms will then be obtained for 8 or 9 miles farther, when Third point will bear S.W. distant about 2 miles.

If a vessel following this track, after having passed Second point, should shoal the soundings under 6 fathoms, she will be getting too near the Sumatra flat, and should haul out more to the eastward; remembering

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that Second point must not be brought eastward of S. by E. ¾ E. until Parmassang peak bears E.S.E., to clear the spit or horn projecting from the bank.

From the above position off Third point, a W. by N. ¼ N. course may be steered for about 28 or 29 miles, which, if the vessel be not affected by tides or currents, will place her in a position from which Fourth point will bear about S.E. ¾ S., distant 7 miles, and Monopin hill N. ¼ E. to N. ½ E.

In this track a vessel will have soundings varing from 12 to 9 fathoms, and occasionally a cast of 13 or 14 fathoms, perhaps for about 21 miles, when she will be near the position of the 5 and 6 fathoms banks lying north eastward of Fourth point (page 209). If a straight course has been steered she will pass between those banks in 13 or 14 fathoms, probably getting one or two casts of 8 fathoms. When Fourth point is abeam, it should be distant 4½ miles, and from 12 to 15 fathoms will then be carried until Fourth point bears S.E. ¾ S. distant 7 miles.

Thence steer about N.W. by W. for Batakarang point,—paying particular attention to the tides, which frequently set strong into or out of the Palembang rivers (page 212),—and the vessel will soon pass over a narrow bank of sand, having 7 fathoms on it, and then again deepen the water to 13 and 16 fathoms. Having run 15 or 16 miles, the soundings will again decrease under 10 fathoms, and she will be on the edge of the bank extending from Batakarang point, and may proceed along the edge of it in from 8 to 6 fathoms; the directions given at page 232 must then be followed to pass westward of Frederick Hendrick rocks, which channel is recommended as being the best and safest, especially at night.

If, however, from a position about 7 miles N.W. ¾ N. from Fourth point, it be determined to proceed through the channel between Frederick Hendrick rocks and Transit rock, steer N.W. by W. for 7 or 8 miles, until Monopin hill bears about N.E. by N. or N.E. ½ N., when a N. ¾ W. or N. by W. course will lead about midway between those dangers, but their clearing marks, given at pages 230 and 231, must be carefully attended to. In this track 14 to 17 fathoms will be obtained until abreast of Karang Hajdi reef, when the soundings will deepen to 24 and 27 fathoms, if the vessel be 3 miles westward of the reef, but if distant 4 miles or more from it, they will be but from 15 to 18 fathoms.

When steering a N. ¾ W. or N. by W. course, if after having deepened the water to 24 or 27 fathoms, and brought the lighthouse about S.E. by E., a vessel should shoal suddenly to 17 or 16 fathoms, and immediately after deepen to 27 or 33 fathoms, she will have passed over a rocky patch which lies on that bearing from the lighthouse, distant 6 miles. Another rocky patch of only 12 fathoms over it lies N.N.W. ½ W. 2⅓ miles from the 16-fathoms patch, and N.W. ¼ W. 8 miles from the lighthouse;

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and a short distance to the north-east of it there is a patch of only 7 fathoms: these two latter patches are in the fairway of the channel between Frederick Hendrick and Transit rocks.

Directions through Banka Strait from the Northward.—A vessel having passed the Toedjoe or Seven islands, and steering to the southward for the entrance of Banka strait, will find no difficulty in clear weather in determining her position, which can be readily done by cross bearings of Gunong Punyabung or Saddle hill, and Monopin hill; under such circumstances the strait can be entered on either side of Frederick Hendrick rocks by attending to the directions given at page 232. But in thick weather it often happens that no land can be seen until the vessel has arrived very near to the entrance of the strait, and at such times it is important to get hold of the bank extending from the Sumatra coast, and then proceed along its edge in 8 to 6 fathoms, carefully attending to the lead. Sometimes Monopin hill will be seen but no other land, in such case it will be prudent to proceed as before, keeping along the edge of the bank.

With Monopin hill bearing S.E. $\frac{1}{2}$ E., a vessel will be about 8 miles, and with it bearing S.E. by E., about 6 miles to the northward of Frederick Hendrick rocks, and can pass westward of them as before directed. When Monopin hill bears about East, she will be more than 2 miles to the southward of the shoal, and may steer S.E. $\frac{1}{2}$ S., for about 11 or 12 miles, till Monopin hill is in line with the lighthouse on Tanjong Kalian N.E. $\frac{1}{2}$ N.; the course will then be S.E. by E. for 6 or 7 miles, or until Monopin hill bears about N. $\frac{1}{4}$ E. or N. $\frac{1}{2}$ E. when Fourth point should bear about S.E. $\frac{1}{2}$ S., or S.E. $\frac{3}{4}$ S., and be distant 6 or 7 miles. From this position, it will be only necessary to reverse the order of the directions given at pages 241 and 242.

Working through Banka Strait.—Directions have been already given in pages 237 and 239, for working into the strait from the southward, and in page 232 for working into it from the northward by the channels on either side of Frederick Hendrick rocks; it may, however, be as well to remark again here that the passage westward of Frederick Hendrick rocks is much to be preferred at night, or when the land is obscured and reliable bearings cannot be obtained. By tacking in 9 fathoms when standing towards the rocks, all round which, are depths of 16 to 20 fathoms, and tacking in 5 or $4\frac{1}{2}$ fathoms when standing towards the Sumatra bank, where the soundings decrease regularly, a vessel will run no risk, nor experience any difficulty.

The bank fronting the Sumatra coast may be conveniently approached when well between the points, by common attention to the lead; but off the points and for a few miles on either side of them great attention must be paid to the soundings, and the bank approached with caution, and never

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under a depth of 10 fathoms, as the water shoals suddenly from that depth. The most dangerous part of the bank is from Fourth point for about 6 miles to the westward of it (page 210), which must be approached with the utmost caution.

Mr. Stanton strongly recommends vessels working in either direction through the strait, or proceeding through with a fair wind and contrary tide, to avoid the Sumatra coast and keep on the Banka shore, between Lalarie point and Tanjong Tadah. He observes that hitherto it has been the custom for all vessels to work along the Sumatra coast, where they have not only a strong wind but a constant current to contend with, consequently sailing vessels have been delayed two or three weeks, and instances are known of vessels being a month making the passage through Banka strait, whereas a smart sailing vessel, by keeping on the Banka side, taking advantage of the tides and following the directions given below, may make the passage even in the full strength of the monsoon in three or four days.

The advantages gained by keeping on the Banka coast are as follows:—

A vessel may carry a fair tide all the way through by starting from either extremity at low water, as the tidal waves from the China and Java seas meet near Nangka islands; prominent hills and points, with a gradual decrease in the soundings give confidence to mariners when steering for the land; a strong land wind will be generally experienced during the night, when the regular monsoon is blowing in the middle of the strait and near the Sumatra coast; and in the strength of the monsoon regular tides will be met with on the Banka shore, while strong currents will invariably be found setting to leeward along the Sumatra shore.

From the Southward.—In working between Lalarie point and Nangka islands the lead is a good guide, as the soundings decrease regularly, except near Lalarie point and Timbaga rocks, where they decrease rather suddenly from a depth of 10 fathoms; if, however Lalarie point be not brought south of S.E. ½ S. until Brani peak bears E. by N. ¾ N., a vessel will keep clear of all danger near Timbaga rocks. Having arrived within 3 miles of Great Nangka, the spit extending from the south end of that island should not be approached under a depth of 7 fathoms; and to avoid the rocky ledges extending from Middle and West Nangka, West reef (6 feet above water, page 222,) should not be brought to the westward of North after the peak of Great Nangka bears N.E., until the vessel is to the northward of Nangka islands.

From Nangka islands to Tanjong Tadah the shore may be safely approached by the lead, as the soundings are shoal with a gradual decrease. When Tanjong Tadah bears N.E. ¾ N., (which clears the

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eastern side of Karang Brom Brom,) vessels should cross over towards Fourth point on the Samatra coast.

From the Northward.—Coming from the northward, it is merely necessary to reverse the order of the above directions. Vessels should keep towards the Sumatra coast until past Fourth point, which they should not approach nearer than 3 miles. When Tanjong Tadah bears N.E. ¾ N., they may cross over to the Banka side, taking care not to bring that point to the eastward of the above bearing. From Tanjong Tadah to Nangka islands they may stand in-shore guided by the lead; but having arrived abreast of the latter, take care not to bring West reef to the westward of North, until the peak of Great Nangka island bears N.E., and not approach the spit off the south end of the island under 7 fathoms. From 2½ miles south of Nangka islands the shore may be approached by the lead to any convenient depth of water, but when Brani peak bears E. by N. ½ N. the vessel will be nearing Timbaga rocks, and must not then come under 10 fathoms. Lalarie point bearing S.E. ½ S. clears all the dangers near Timbaga rocks, and the point should not be brought to the southward of that bearing, until Casuarina point bears East. Thence to Lalarie point the shore may be again approached by the lead; but when nearing the point the soundings decrease more suddenly, and a vessel should not go into a less depth than 10 fathoms, and should round the point at the distance of about 1½ miles. Thence she can proceed to the southward through either Stanton or Lucipara channels, according to the directions given at pages 236 and 239.

NORTH-WEST AND NORTH COASTS OF BANKA.

BULU or Jibuse Bay.—The north-west coast of Banka is 43 miles in extent, from Tanjong Oelar to Tanjong Melalu, Bulu or Jibuse bay occupying more than half of that space. From Tanjong Biat (page 230), the south-western point of the bay, to Tanjong Ginting, its north-western point, the direction is about N.E. ¾ N., and the distance 17½ miles; the depth of the bay is 7 miles.

The whole of this bay is shallow to a distance of 3 miles from the shore, except to the southward of Tanjong Ginting, where the shoals do not appear to extend farther than a quarter of a mile. The rivers Bulu and Jibuse disembogue in its north-east part. The bay is much visited by coasters, and occasionally by larger vessels for the purpose of loading tin.

Anchorage.—Nepo bay in the north part of Bulu bay affords anchorage in 5 or 6 fathoms, soft muddy bottom, with Tanjong Ginting bearing N. by E. ½ E., Songi Bulu E. ½ S., and the watering place N. E. by E. ½ E.; or in 5 fathoms off Songi Bulu, with the village N.E. ½ E. and Tanjong Ginting N. by W. ¾ W., 3 miles from the shore.

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Water.—Fresh water can be obtained in a small bay about 1½ miles to the eastward of Tanjong Ginting.*

TANJONG GINTING, the north-west point of Bulu bay, is a long low point, having a reef projecting two miles from it, close to which are 8 fathoms water. The position of the point may be easily recognised by the three hills, Gunong Paree, Gunong Punyabung, and Gunong Jerankat, which at a great distance appear like islands. The first, 858 feet high, is the most southern one of the three, and rises 4 miles East of the point; Gunong Punyabung, a remarkable saddle-shaped hill, 794 feet high, very conspicuous from seaward, rises close to the coast, about 3 miles north-eastward of Tanjong Ginting; Gunong Jerankat, 657 feet high, is about 4 miles E.N.E. from Gunong Punyabung.

The Coast between Tanjong Ginting and Gunong Punyabung forms a small bay, which appears to be nearly filled with rocks. It then continues to the north-eastward for 4 miles to Pulo Pamujah, an islet lying close to the coast, thence in a direction a little more to the eastward for 5 miles to Tanjong Dugong, off which lies Pulo Prout, and several islets and rocks; it then trends E.N.E. about 9 miles to Tanjong Melalu. The whole coast between Gunong Punyabung and Tanjong Melalu is fronted by a reef which projects one or 2 miles from the shore.

MALAN HYŪ, MALAN DOYANG, and MALAN GUNTUR arè three rocks lying off the coast between Tanjong Dugong and Tanjong Melalu. Malan Hyū is about the size of a boat, and covered with white guano. It lies about 3 miles North from Tanjong Dugong, with Gunong Punyabung bearing S.W. by S., mount Melalu E. ¼ S., and Malan Doyang E. by N. ½ N., distant nearly 4 miles.

Malan Doyang is not much above water, and only the size of Malan Hyū. It lies about 3 miles off shore, with Gunong Punyabung S.W. ¼ S., Tanjong Melalu E. by S. ¼ S., and Malan Guntur E. by S. Sunken rocks are shown on the chart about midway between Malan Doyang and the shore in a S. by W. direction from the former.

Malan Guntur is nearly midway between Malan Doyang and Tanjong Melalu, and about a mile off shore. It is larger than the other two rocks, and lies within the limit of the shoal water projecting from the coast.

All these rocks appear to be surrounded to a short distance by sunken rocks. Close to the northward of them the depths are very irregular, 17 to

* Our supply of fresh water getting short, we anchored in 5¼ fathoms, mud, with Tanjong Ginting bearing N. by E. ¼ E. about 1¼ miles, and Monopin peak S.S.W. 30 tons were obtained in 24 hours, but the water was very brackish, and much trouble was experienced in rafting the casks to the ship.—J. W. King, Master of H.M.S. *Vernon*, March 1847.

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27 fathoms; and 7 to 13 fathoms, rocky bottom, between them and the shore. By keeping 4 miles off Banka, all these dangers are avoided.

KLABAT BAY. — Tanjong Melalu, in lat. 1° 31½′ S., long. 105° 38¼′ E., is the western point of entrance of Klabat bay, and upon it is a hill of moderate height, known as mount Melalu. Here the north-west coast of Banka terminates, as the coast line on the other side of Klabat bay entrance trends to the eastward, and forms the north shore of the island.

Klabat bay runs up into Banka island about 27 miles in a south-east direction, but being encumbered with many rocks and shoals, there is only a narrow passage left, of 4 or 5 fathoms water, by which vessels of heavy burden proceed as far as the mouth of Menjangan river. Over the head of the bay is situated the highest of the Banka mountains, named Gunong Marass or Crown peak. This beautiful mountain is easily recognised by its three peaks, the summits of which may often be seen when passing through Banka strait, presenting somewhat the appearance of a crown. The highest of the peaks, 2,300 feet high, is in lat. 1° 51′ S., and long. 105° 53′ E.

Tanjong Punyusah, the eastern point of Klabat bay, is a long low projection, with an islet and some rocks extending nearly 2 miles from it.

Karang Trassie Laut is a reef with only 2 fathoms water over it, and 10 and 11 fathoms around it, lying about 3 miles N.W. ½ N. from Tanjong Punyusah. From the reef the west point of Punyusah islet is in line with the hill near Monkubur point, bearing S.S.E., Pulo Moncudu East, and mount Melalu S.W. by W. ¼ W.

A boat of H.N.M. schooner *Dolphin*, in May 1846, examined this reef, and found it to be of small extent, with not less than 3 fathoms over it, and 11 to 12 fathoms around it.

Anchorage.—Vessels coming to Klabat bay for cargoes of tin, usually anchor outside the entrance, between its eastern point and the Karang Trassie Laut, in 9½ or 10 fathoms, soft muddy bottom, having Punyusah islet in line with Gunong Marass S.S.E. ½ E., Klabat hill S.S.W. ½ W., Melalu point W. by S. ¼ S., and Pulo Moncudu E. ¾ N.

The Coast, from Tanjong Punyusah, trends, with a slight curve inland, a direction about E. by N. for 10½ miles, to a point abreast of a small islet named Pulo Moncudu ; and thence East for 2½ miles to Tanjong Crassok, the northernmost point of Banka, in lat. 1° 29′ S., long. 105° 57½′ E.

Many rocks lie close to this part of the coast, and shoal water extends nearly a mile from it. From Tanjong Crassok the coast trends to the south-eastward, forming the north-east coast of Banka, for a description of which *see* pages 289 to 296.

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Reefs.—A reef, having 3¼ fathoms water over it, lies about 2 miles off shore with Pulo Moncudu bearing East, and Gunong Chundong S.E.

A reef having 7½ feet water, lies about 1½ miles from the shore, and nearly midway between Tanjong Crassok and Tanjong Tuen, with Tanjong Crassok bearing W. by N. ½ N., Pulo Pongoh off Tanjong Tuen S.E. ¼ S., and Pakoe point S. by E. About 2 miles W.N.W. of this reef, lies a shoal, distant about 3 miles from the shore.

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CHAPTER VI.

GASPAR STRAIT.—NORTH-EAST COAST OF BANKA.—SHOALS NORTHWARD AND NORTH-WESTWARD OF GASPAR STRAIT.

VARIATION, 1° 10′ East in 1878.

GENERAL DESCRIPTION.—Gaspar strait, between the large islands of Banka and Billiton, derives it name, as we are informed by Horsburgh, from the Spanish captain who passed through it in 1724, though Captain Hurle had previously done so when returning from China in the *Macclesfield* galley, in March 1702. Many small islands divide the strait into three principal branches, having the names of Macclesfield, Clements, and Stolze channels. The first, through which the *Macclesfield* passed, is formed by Lepar and Leat islands. The second is named after Captain Clements, who command a fleet of English India ships in 1781, and who on returning from China, chose the passage formed by Leat, Barn, and Saddle islands to the westward, and North and South islands to the eastward. The third, Stolze channel, is bounded by Table island on the west side, and Mendanao, or Long island, on the east side, and is so named after the Dutch naval officer, J. Stolze, who was deputed to ascertain the positions of the islands on the west coast of Billiton.*

Although the navigation of this strait is encumbered with many dangers, yet as the course by it is more direct, and the distance less than by that of Banka, many seamen are induced to prefer it, especially when returning from China late in the north-east monsoon. The comparative advantages of both straits with reference to vessels bound to Singapore and China have been shown at page 152; and it will only be necessary here to add a few remarks with reference to those returning from China.

The fast clipper ships which every season contend for the honour of landing the first of the year's teas in England, usually proceed through Gaspar strait, as do most homeward bound vessels to whom saving of time is of the first importance, and there can be no doubt but they will continue to do so in preference to the more circuitous, although much

* *See* Admiralty charts :—Eastern archipelago, western portion, No. 941A; Gaspar Strait, with Views, No. 2,137, scale $m = 0{\cdot}4$ of an inch; Gaspar and Banka straits, No. 2,149, scale $m = 0{\cdot}14$ of an inch.

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safer route of Banka strait. Until, however, the correct positions of the shoals and dangers known to exist to the northward of Gaspar strait are determined, and this space properly explored, a vigilant look out must be keep when approaching the strait from the northward, as dangers may exist that are not marked on the charts. Nor must vigilance be relaxed when getting near to Pulo Leat, and when passing through the strait. No opportunity should be lost of determining the vessel's exact position; and the greatest attention should be paid to ascertaining the set of the current and to guard against its effects. Many fine ships have been lost in Gaspar strait;* not a few on the Alceste reef, from wrongly estimating their distance from the land; but in the majority of instances from causes which might have been guarded against by the exercise of due care and judgment.

Macclesfield channel is the one generally taken, although Stolze channel appears to be much less intricate and more free from danger. Clements channel is much narrower than either of the other two, and being encumbered with dangers in its narrowest part, its navigation is more difficult and unsafe.

Gaspar strait was surveyed in 1854 by the officers of the United States navy attached to an exploring expedition; and in the following description of the dangers, most of the positions, bearings, and distances, &c. have been taken from the chart, No. 2,137, constructed by them.

DANGERS SOUTHWARD OF GASPAR STRAIT.

Dangerous shoals extend for about 35 miles to the southward of Gaspar strait, rendering great caution necessary when approaching the strait from that direction.

HANCOCK SHOAL, in lat. 3° 34¼′ S., long. 107° 4′ 20″ E., is the most southern of the authenticated dangers at the entrance of Gaspar strait. It is a small patch about a quarter of a mile in extent, but whether composed of sand or coral does not appear on the chart. It has only one fathom of water over it, and 6 to 7 fathoms around it.

DOUBTFUL DANGERS.—A Doubtful rock was marked in former charts at 3⅜ miles S.W. by W. ¼ W. of Hancock shoal; a small shoal of 6 feet water, named Mary Goddard, at 4½ miles S.S.E. of the Hancock; and another of 12 feet water, named Sharpshooter reef, at

* In the Nautical Magazine for 1861 it is stated that "the *Herculaneum*, with a cargo "of tea and silk valued at 70,000*l*., was totally lost on the Alceste reef, being the ninth "vessel lost this year in Gaspar strait." In the early part of 1865 five vessels were totally lost in Gaspar strait, three of them upon the Alceste reef.

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11 miles W. ¾ S. from Hancock shoal; but a careful search having been made for these dangers in May 1866 by Mr. Wilds, Master commanding H.M. Surveying Vessel *Swallow*, without the slightest indication of their existence, they have been expunged from the charts.

HIPPOGRIFFE ROCK.*—Mr. Wilds also searched for the Hippogriffe rock, and found it in lat. 3° 33′ 36″ S., long. 106° 54′ 30″ E. It is a dangerous boulder rock, with only 3 feet over it at low water, of circular shape, and about 150 feet in diameter, having large branches of coral upon it. It was not seen until close-to, and at the time it was examined there was not the slightest swell or ripple to indicate its position; the weather being fine and clear, and the wind light from the S.S.E Regular soundings of 8 fathoms, sand and shell, were found around it, and the water in that depth was of a pale colour.

Hippogriffe rock (1876) is said to lie about 2 miles S.S.E. of the position assigned to it on the chart, and the shoal ground to be about 5 cables in extent.

TURTLE SHOAL lies about 2 miles N.E. by E. from Hancock shoal, and is of about the same extent; it has but 3 feet water over it, and 8 to 12 fathoms around it. There are tide ripples over this shoal.

LARABE SHOAL, distant nearly 6 miles E. by N. ¼ N. from the Hancock shoal, is about a third of a mile in extent, having 3¼ fathoms of water over it, and 5 to 8 fathoms around it.

SAND ISLAND is the name given to a small patch of sand, just awash at high water, with 8 to 14 fathoms water around it, lying about 4 miles N. ¾ W. from Larabe shoal. At a third of a mile E.N.E. from Sand island is a shoal patch about a third of a mile in extent, having 2½ fathoms water over it and 8 to 9 fathoms around it; the tide also ripples over this bank.

There is a danger, named Padang reef, marked on the chart about 2¼ miles W. ½ N. of Sand island, but we have no information about it.

MIDDLE REEF, lying N.N.E. ¾ E. nearly 2½ miles from Sand island, appears to be a rock, just above water, on the north end of a small sand patch having 2 fathoms water over it, and 8 to 9 fathoms around it.

BRANDING BREAKERS.—North-west, nearly 1¾ miles from Middle reef, are two small patches occupying a space about two-thirds of a mile in extent, E.N.E. and W.S.W., and with 12 fathoms water between them. The western patch has 1¼ fathoms water over it, the eastern one only 3 feet; all around them are 7 or 8 fathoms.

* Named after an American ship lost on it.—Mercantile Marine Magazines for 1859, page 222; 1860, page 65, and 1869, page 346.

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FAIRLIE ROCK, lying W. ¾ N. 10½ miles from Sand island, was discovered by the East India Company's ship of that name grounding upon it in 1813. It is of coral, about a cable in diameter, nearly awash at low water, and 6 or 7 fathoms close around it. The sea breaks over the rock, and all around are overfalls caused by the rocky and uneven character of the bottom. From it Entrance point, the south-eastern extreme of Pulo Lepar, bears N. by W. ½ W., distant 26¼ miles, and Shoal-water island N.E. by E. 15 miles, and just in sight from the deck of a large ship; therefore to avoid this rock, Shoal-water island must, from the deck of a large ship, be below the horizon by the time it bears N.E. by E., this island being the only land distinctly visible from the rock.

SHOAL-WATER ISLAND and SHOALS form a group amongst which it would not be prudent to venture. Shoal-water or Embleton island, lying N. by E. ¼ E., 10 miles from Sand island, is a little more than half a mile in diameter, and from it Middle reef bears S. ¾ W., distant 8 miles. Hancock is a small island lying N.E. ½ N. three-quarters of a mile from Shoal-water island.

Dangerous reefs surround both these islands, among which are some deep but very narrow and intricate channels. From Shoal-water island a reef extends from half to three-quarters of a mile, on its south-east, south, and south-west sides; and about half a mile off its west side is a small detached reef having 10 fathoms between it and the reef bordering that side of the island; off its east side reefs extend nearly 1½ miles. The reefs surrounding Hancock island are separated from those around Shoal-water island by a very narrow channel with depths of 6 to 10 fathoms in it. On the north-east side of Hancock the reef extends about a third of a mile, and on its north-west side about three-quarters of a mile, with some rocks above water on its outer edge.

One-fathom Patch.—A patch having but one fathom water over it, and 7 to 9 fathoms around it, lies W. ¼ N. nearly 2 miles from Shoal-water island.

Embleton Rock is just above water on the north-west extreme of a bank of hard sand, which nearly dries, distant 2 miles N.N.W. ¾ W. from Shoal-water island; there are 12 to 14 fathoms around it.

Bliss Shoal, lying N.E. by E. nearly a mile from Embleton rock, and N. ¾ W. 2¼ miles from Shoal-water island, is about a third of a mile in extent, N.W. and S.E.; it has only a quarter of a fathom water over it, and 6 to 14 fathoms at a short distance from it.

There appear to be no dangers between the reefs contiguous to Shoal-water and Hancock islands, or between One-fathom patch, Embleton rock, and Bliss shoal, the soundings being 6 to 14 fathoms; but vessels had

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better keep well outside, as there is nothing to be gained by venturing among these dangers.

BLAS MATEU ROCK is said to lie right in the fairway track of vessels proceeding through Gaspar strait by Macclesfield channel. The American surveyors searched for it without success, but their chart does not exhibit many soundings in that vicinity, and it would be very unsafe to disregard its reputed existence in the face of the following circumstantial account, which is taken from page 294 of the Java Guide—Blas Mateu rock was first discovered on September 23, 1839, by the Spanish brig *San Joachim*, Captain Blas Mateu. Having anchored in 12 fathoms, coarse sand, he took the boat and found three rocks, each about 10 feet in diameter. Upon the northern rock he had 9 feet, on the southern 12 feet, and on the western 17 feet water, and between them passages of 4½ fathoms. Shoal water island bore E. ¼ N., the opening between the two hills on Lepar island N.N.W. ½ W., and the latitude determined by the sun's meridian altitude 3° 20′ 38″ S. The whole extent of the three rocks is about half a cable, and round them the depths were 12, 13, and 14 fathoms; but there was reason to believe that there were more rocks, because the chain parted while the anchor was being weighed.

Another Spanish captain, M. Aldon, who examined these rocks afterwards, gives them a similar description, and states that the light colour of the water over them was distinctly visible at a considerable distance N.N.W. of them. He places them in 3° 21′ S., with Fairlie rock S.S.E. ¾ E., Shoal-water island East, and the hills of Lepar island N.N.W.

To avoid this danger Entrance point must not be brought more to the westward than N. ½ W., when Shoal-water island bears between E. ½ S. and E. ¼ N.

SAND-BANKS.—At 12¾ miles South of Entrance point is a patch of 5 fathoms; and at 2½ miles W. ½ S. of this is another of the same depth; between them the depth is 7 fathoms. These spots appear to be on the eastern end of one of the long sand-ridges which lie to the southward of Banka (page 215), probably an extension of the strip upon which is shown the following sounding of 4½ fathoms.

A bank* in 3° 19′ S., with 4½ fathoms water, lies South from a remarkable hummock in Banka; and there are two other banks of 5 fathoms, from which a hummock upon the long low point of Baginda bears

* The account of this and of the two 5-fathoms banks is taken from the Seaman's guide round Java, page 293. The 4½ fathoms was not found by Mr. Stanton, and the latter would appear by the American survey to be farther to the eastward. It is, however, very possible that other 5-fathoms patches may exist, as the American chart exhibits no soundings in this direction.

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N.N.W. ¼ W. To avoid these banks the low land which unites the hills of Banka must be kept from a vessel's deck below the horison, till Entrance point bears N. by E., when a vessel may steer towards the strait; taking care not to bring this point more to the eastward than N. by E. or N. ½ E.

VANSITTART SHOALS are a collection of rocky patches divided into groups, lying between the bearings of S.E. ½ E. and E. ¾ S., distant about 12 miles from Entrance point, and extending from lat. 3° 10′ to 3° 4′ S. At their southern part are two patches, lying E. ½ S. and W. ½ N. from each other, their inner edges being about 2⅓ miles, and their outer edges nearly 3½ miles apart. From the western patch of 1¾ fathoms water, Entrace point bears N.W. ½ W. 12 miles, Shoal-water island S.E. ¼ E. 14 miles, and Barn island N.N.E. ¼ E. 12 miles; from the eastern patch of only 3 feet water, Shoal-water island bears S.E. ½ S. 11½ miles, and Barn island N. by E. ¼ E. 11 miles.

Nearly the centre of the space occupied by these shoals are a group of patches extending N.E. and S.W. about a mile, some having but one fathom over them, and one patch, the north-eastern, dries at low water.

The patches at the northern end of the shoals lie close together, and extend in an E.N.E. and W.S.W. direction, about 2½ miles. One or two of them are dry, and others have but 3 feet water over them at low tides. From the south-west patch, which dries, Barn island bears N.N.E. ½ E., distant 6½ miles; the south extreme of Saddle island is open of the south extreme of Low island, N.E. by E. ½ E.; and Pulo Jelaka bears N. by W. ⅔ W. 13 miles. From the north-east patch, of 2 fathoms water, Low island is distant 2½ miles, with its south extreme in line with the middle of Saddle island, bearing N.E. by E.; and Sand island is just open of the east extreme of Pulo Leat, bearing N. ½ W.

For the marks to clear the Vansittart shoals, *see* directions, page 265.

Soundings.—At 3 or 4 miles south of the Vansittart shoals are 12 or 13 fathoms. About 1½ miles south of the south-western extreme are 19 or 20 fathoms, but close to it on that side are 17 fathoms. The soundings deepen from the southward towards the south-eastern extreme; at three-quarters of a mile from it are 16 fathoms, increasing to 19 or 22 fathoms close to the shoal. On the east side of the southern and middle groups of patches are 13 fathoms close-to, decreasing to 11 and 9 fathoms at 2 to 4 miles distance; but near the northern group the water on the east side is somewhat deeper, 14 to 17 fathoms close to the patches, and 15 to 18 fathoms 2 or 3 miles off. The soundings on the west side of the shoals vary from 21 to 28 fathoms, decreasing towards the Banka shore.

GEORGE BANKS is the name given, on the American chart, to four or five patches, under a depth of 5 fathoms, lying southward and

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south-westward of Entrance piont. The southern extreme of one of these patches which is about 1½ miles long North and South, half a mile broad, and has 3 fathoms water on it, lies S.W. ½ S. 4¾ miles from Entrance point. About a mile south-west of this patch is another, but smaller one, of 3½ fathoms water; and 4 miles S.W. by W. ¼ W. from this last patch, or S.W. ¼ W. 9 miles from Entrance point, is a patch of 3¼ fathoms water, but this latter lies quite out of the ordinary track of vessels.

Two-and-a-half Fathoms Bank.—About the middle of this bank, and about a mile from its outer or eastern edge, is a patch of only 2½ fathoms water. This was formerly known as George bank, because the ship *Royal George* had in 1813 passed over its edge in 5½ fathoms; it was afterwards explored by Captain D. Ross. From it Entrance point bears N. ⅓ W., distant 6½ miles; and Baginda peak, on Banka island, W. by N. ⅔ N., 12½ miles. To avoid this bank, keep the high trees near Rocky point, or Rocky point hill, open to the eastward of Entrance point.

About 2 miles West of the 2½-fathoms bank is a small patch with 5 fathoms water over it.

Two-fathoms Patch.—It would appear from the following report of Captain Keay, of the ship *Falcon*,* that a patch having but 2 fathoms water over it, lies about 3 miles to the southward of Round island:—

"At 9 a.m., March 13th, 1862, clear, light, northerly, and smooth sea; steering towards Entrance point, Gaspar strait; Round island bearing N. ½ W. by compass, apparently 3 miles distant, the *Falcon*, drawing 18 feet, ran aground on a small sand patch, with 15 feet water over it ship's head N.E. by E. ½ E. The depth did not vary until 10 a.m. then began to fall, and at 6 p.m. there was barely 12 feet water amidships; the diameter of the shallowest part was about 30 feet. At low water had 16 feet under the bows, 19 feet under the stern, 12 feet abreast of main rigging; and to the southward from ahead to right astern, at the distance of half a cable, the depths were 3 to 3½ fathoms. It is scarcely possible, with such opportunity of judging, to be a quarter of a mile wrong in stating a 3 miles' distance from Round island; it may therefore be a detached bank, as the southern edge of the 3 to 3½ fathoms shoal by Admiralty chart bears a point more easterly, and is only 2¼ miles from Round island; also the small 3½-fathom patch, about 2½ miles S. by W. from the island, cannot be the same spot. Had circumstances permitted, this might have been determined by sounding; had no time for doing so

* Mercantile Magazine for 1862, p. 285.

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more than was necessary to get the ship off and proceed while a leading N.W. wind lasted."*

MACCLESFIELD CHANNEL.

The approach to Macclesfield channel from the southward, is bounded on the eastern side by Hippogriffe, and Fairlie rocks, and Vansittart shoals; and on the western side by Two-and-a-half Fathoms bank. Blas Mateu rock, if it exists, lies right in the fairway.

Hancock and Turtle shoals may be said to form a point, from which the shoals already mentioned as bounding the eastern limit of approach to Macclesfield channel diverge in one direction, whilst those forming the western limit of approach to Stolze and Clement channel diverge in another; these last may also be said to form the eastern limits of the southern entrance to Macclesfield channel, as vessels may stand to the eastward of Fairlie rock over towards them, if they should find it convenient to do so.

EAST COAST of BANKA.—From Tanjong Baginda (page 214), the south-western limit of Gaspar strait, the coast of Banka trends to the northward 4 miles to Roe point, thence it recedes and forms a large bay, the northern limit of which is Brekat point, the north-western limit of Gaspar strait. There are several rivers upon this part of the coast, the principal of which, Medang river, is sometimes visited by coasters, but little is known of it.

LEPAR STRAIT, between Banka and Pulo Lepar, is 6 or 7 miles wide at the south-east entrance, but narrows to less than 2 miles some 4 or 5 miles within. This entrance appears from the chart to be barred, although there seems to be deep water inside. It is said to contain so many small islands and reefs, as to be available only for small coasting vessels. The most southern of these islands, named Sugar-loaf, is conspicuous, rising to a peak 915 feet high.

PULO LEPAR is an irregularly shaped island, about 12 miles in diameter, lying close off the southern part of the east coast of Banka. On its southern part are several ranges of hills of moderate elevation; viz.:— Six-peak range 781 feet high, Maroon hill 850 feet, Four-peak range 750 feet, and two hills not named on the chart 650 feet high; farther to the westward is a hill 700 feet high, named False Sugar-loaf.

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* As the vessel remained ashore all day, it is to be regretted that no bearings were taken of Entrance point, Baginda hill, and other objects, to determine the position of this danger, which now rests upon a bearing of Round island and an estimated distance from it.

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Moerong or Entrance Point is the south-eastern extreme of Pulo Lepar. The land over it is hilly, and the point is bordered by a reef, extending one or 2 cables from it.

Pergam or Round island is a small islet surrounded by reefs, lying W.S.W. $2\frac{2}{3}$ miles from Entrance point, and about half a mile off the south coast of the island.

False Rocky point bears N. $\frac{3}{4}$ E., distant 4 miles from Entrance Point. Immediately to the northward of it is a small stream named Red river.

Laboe or Rocky Point, the north-east extreme of Pulo Lepar, is distant $1\frac{1}{2}$ miles N. $\frac{1}{2}$ E. from False Rocky point. Rocky point hill 522 feet high, stands $1\frac{3}{4}$ miles to the westward of the point.

At $1\frac{1}{4}$ miles N.W. $\frac{3}{4}$ W. from Rocky point is Tree point, from which the coast trends to the north-westward for about 6 miles.

LIGHT.—On Rocky point a fixed white light is exhibited at an elevation of 39 feet above high water, and in clear weather should be seen from a distance of 8 miles.

Shore Reef.—The whole coast from Entrance point to Tree point is fronted by a reef, which at about 2 miles northward of Entrance point, just to the southward of the entrance of Fresh-water river, extends off to the distance of $1\frac{1}{2}$ miles; it then extends to the northward, and rounding Rocky point at a quarter of a mile, turns to the north-westward, and beyond Tree point projects but a short distance from the shore.

Water.—To the northward of Entrance point the coast forms a bay, in which are two small rivers. Vessels may anchor about a mile to the north-eastward of the point, abreast of which position is a sandy beach. Captain Ross watered here, and found the water a little tinged with a red colour, but it produced no pernicious effect upon the crew.

KLIPPIGE SHOALS is the name given to three or four reefs, having rocks above water, with deep channels between, lying off Rocky point. The outer reef lies E. by N. $\frac{2}{3}$ N. 2 miles from the point; the southern reef, over which is a depth of 4 fathoms, lies E. $\frac{1}{3}$ N., 2 miles from False Rocky point.

Close to these shoals are depths varying from 9 to 14 fathoms, and there appears to be a channel three-quarters of a mile wide, with 6 to 10 fathoms in it, between them and the shore, but it would be unwise to use it.

DISCOVERY ROCKS appear on the American chart as two rocks lying N.N.E. $\frac{1}{2}$ E. $3\frac{3}{4}$ miles from Rocky point, with a shoal bank extending nearly half a mile north-eastward of them. Close to the rocks and bank are 6 to 10 fathoms with 13 to 15 fathoms at a short distance around.

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Captain D. Ross, in the *Discovery*, was the first to determine the exact position of these rocks, and he gives the following description:—"I once before passed very near the situation of this rock without perceiving any indication of danger, but while passing at this time I observed a breaker (it was low water and spring tide), which on examination was found to be on a sunken coral rock, in diameter about 30 yards, having only 2 feet water upon it, and with perpendicular sides, as within a boat's length of it there were 7 fathoms water. Notwithstanding it had only 2 feet water, the sea did not break upon it above once an hour. In the vicinity of the rock the depth is 20 fathoms, but a rocky bank or ridge projects from it about a quarter of a mile to the eastward, with 6, 7, 10, and 15 fathoms on its eastern extremity. From the rock Entrance point bore S. by W. ½ W., a rocky point S.S.W., Saddle island S.E. by E. ¼ E., the south point of Leat island E. ¾ S. nearly, the highest clump of trees upon that island East, its north point N.E. by E. ¼ E., the hummock on Brekat point N. by W. ⅔ W., and lying 4 miles from Jelaka island, and the same distance from Rocky point."

A rocky Patch, with only 3 feet water over it, lies about 1½ miles W. by S. from Discovery rocks. In the channel between the soundings are from 10 to 16 fathoms.

PULO LEAT, which separate Macclesfield channel from Clements channel, is about 5¾ miles long, north and south, and 4¾ miles wide. Upon it are several hills, 400 to 600 feet high, which appear at a distance like a group of islands.

Pulo Jelaka is a small islet lying about a quarter of a mile north-westward of the west point of Pulo Leat, to which it is connected by a reef of rocks. A dangerous reef surrounds both Pulo Leat and Pulo Jelaka, in addition to which are numerous outlying rocks in many places, extending far from the shore.

The south and south-west coasts of Pulo Leat are fronted by a reef which projects from the shore in a convex form to seaward for the distance of a mile. Off the south-east point of the island are outlying rocks and dangers extending in a S. by W. ¼ W. direction, to the distance of nearly 2½ miles. A rock also lies about three-quarters of a mile South of Pulo Jelaka, just outside the edge of the reef extending from the shore, but there are no other outlying reefs on the south-west coast of the island.

West three-quarters of a mile distant from Pulo Jelaka, outside the reef extending from the shore, is a 3-fathoms patch; and N.W. by W., more than a mile from that islet, is a rock near the water's edge, with 11 fathoms water between it and the shore reef. All along the north-west

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shore of Pulo Leat, and at little less than 2 miles from it, are numerous outlying rocks and patches of reef, between which and the reef extending from the shore are some dry sand-banks.

Light.—On Pulo Jelaka, at an elevation of 39 feet above high water, a fixed white light is exhibited, visible from seaward between the bearings of S.W. by S., round by south and east to N.N.W., and should in clear weather be seen from a distance of 8 miles.

LAMMERMUIR ROCK.—Capt. Joass, of the British ship *Lammermuir*, reports that at 2h. 20m. a.m. 31st December 1863, when proceeding through the Macclesfield channel, his vessel struck on a rock, the position of which, from bearings taken, is lat. 2° 53′ S., long. 107° E.

In the account published in the "Straits Times" it appears that the vessel remained only a very short time on the rock, during which period "she was hanging on a point, twisting round." Under these circumstances accurate bearings could not have been taken, especially at night-time, and a half a point out in the bearing of Entrance point would place the vessel on the reefs off Jelaka islet.

H.M.S. *Rifleman* has since searched for this rock, but could find no danger in the vicinity of the position ascribed to it.

ALCESTE REEF, upon which H.M. ship of that name was wrecked in February 1817, when returning from China with Lord Amherst and suite, is the outer patch of a coral reef which projects nearly 2 miles from the north point of Pulo Leat, and has but 2 fathoms water on its shallowest part. It is the same reef upon which, in 1816, the Portuguese ship *Amelia* was wrecked, the remains of both her and the *Alceste* were visible, with only a few yards between them, at the time the reef was surveyed by Captain D. Ross. The wreck of the *Alceste* was lying 1⅓ miles from the north point of Pulo Leat, with the west point of Pulo Jelaka in one with the southern sand-bank west of Pulo Leat; the northern sand-bank in one with a white rock which lies between Pulo Jelaka and the north-west point of Pulo Leat and close to it; and a white rock near the north-west point open to the eastward of a high tree on the centre of the eastern hill of Pulo Leat.

Many ships have since been lost on this reef, or on some of the coral patches contiguous to it, and they have generally furnished bearings which would show them to have been wrecked some distance from these dangers; but the wrecks of several of them have afterwards been found upon, or close to Alceste reef; and two such wrecks, the *Cornelius Haja** and the

* This vessel was reported to have struck on a rock in lat. 2° 44½′ S., long. 107° 1′ E. —Horsburgh.

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Memnon, have found a place on the American chart. There is good reason to believe that there is no danger in the fairway of Macclesfield channel in this vicinity.

The soundings round Alceste reef do not by any means afford a certain guide, although to the north-eastward they appear to be a few fathoms shoaler than elsewhere. Close-to on the west side are 17 fathoms, and 15 to 21 fathoms at the distance of one or 2 miles; close-to on the north side 12 fathoms, with 16 to 18 fathoms at one or 2 miles; and close-to on the north-east side 16 fathoms, with 12 to 17 fathoms at one to 2 miles.

LIED SHOAL.—The barque *Carl Ronneberg*, Captain C. L. Lied, is reported to have struck upon a rock about 6 miles to the northward of the Alceste reef, in lat. 2° 42′ S., long. 107° 5′ E. It is said to be about a cable in circumference, having from 4 to 20 feet water on it, and surrounded by depths of 19 fathoms.

The American chart exhibits many soundings in the locality ascribed to this danger, which were obtained in searching for the rock on which the *Cornelius Haja* was reported to have been wrecked, said to lie W.S.W., distant 4 miles from the reported position of Lied rock. Mr. Richards, in H.M.S. *Saracen*, also carefully searched for *Cornelius Haja* rock without discovering any danger in that locality: for these reasons Lied rock is not placed upon the Admiralty charts, and the wreck of the *Cornelius Haja* (as mentioned above) was subsequently found by the American surveyors upon Alceste reef.

KILAPAN and SENIOR are two hilly islands lying 2 or 3 miles north of Pulo Lepar. Kilapan is about 1½ miles in extent east and west, and a mile wide; and bears from Rocky point N.W. by N. 6¼ miles. Senior is not quite so large as Kilapan, from which it bears W. by N. 2 miles.

WILSON BANK, discovered by Captain Lestock Wilson, of the *Carnatic*, in February 1787, has but 6 feet water on its shoalest spot, although Captain Wilson did not find less than 3 fathoms. From the one-fathom spot the extreme of Brekat point bears N.N.W. ¼ W. 6⅓ miles; the hummock just inside the point, which is more conspicuous, bearing N.W. by N. The bank extends about a mile to the northward of the shoal patch, having 2¾ fathoms over that part of it; to the southward it extends about a quarter of a mile. Close-to on the east side are 13 or 14 fathoms, but to the N.N.E. 8 to 10 fathoms for about 1¾ miles, when the depths suddenly increase to 19 or 20 fathoms. The extreme of Brekat point bearing N.W. by N., or the hill over it N.W., leads a mile outside Wilson bank, as does also the eastern extreme of Kilapan island bearing S. by W. ¼ W. The same bearings also clear the elbow of Brekat bank.

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BREKAT BANK.—A long narrow strip of bank, which appears to have 3 to 4 fathoms water over it, and deeper water inside of it, extends in a N. by E. direction 3 or 4 miles to the southward of Wilson bank and, passing about 1¼ miles westward of that shoal, forms about a mile farther on, an elbow projecting to seaward, with 1¼ fathoms water on it, and a small patch which dries at low water; it then takes a N. by W. ½ W. direction, until it joins the bank extending from Brekat point, which bears from the elbow N.N.W., distant 4 miles.

The soundings in the channel between Brekat and Wilson banks, are 4½ to 8 fathoms. Near the elbow they decrease suddenly from 10 fathoms; there are 9 or 10 fathoms at 2½ miles eastward of the elbow and 12 and 15 fathoms at a mile north-east of it.

BREKAT POINT, has a rock off it 28 feet high, and forms the eastern extreme of Banka island, and the north-western limit of Gaspar strait. The land from the inner part of the projecting point falls away to the southward, and has a hill or hummock 620 feet high upon it. Immediately off the point are some rocks, and shoal water extends nearly a mile from it to the eastward. The point should not be approached nearer than 2 miles, the soundings off it being deep and irregular, 14 to 21 fathoms.

AKBAR SHOAL.—The American ship *Akbar* struck in 1843 upon a shoal having only 12 feet water upon it, in lat. 2° 39′ S., long. 107° 13½′ E. In the American chart the position of this shoal is marked doubtful, so that the American surveyors did not succeed in finding it.

The ship *Scawful* reports that on 23rd March 1864 she passed close to Akbar shoal, which had apparently very little water on it, though no breakers, as the sea was quite smooth. It appeared to be a narrow ridge of coral, about 2 cables long, north and south, and not half a cable wide. Its position is given as lat. 2° 37½′ S., long. 107° 16′ E.*

This places the shoal 3 miles N.E. by E. from the position ascribed to it by the *Akbar*; in either case it is much in the way of vessels proceeding through Clements or Stolze channels, and until its exact position be determined, it will be necessary to keep clear of the localities in which it is reputed to lie.

Akbar shoal was examined by a boat of the barque *Windermere*, 1876 and is reported to be one cable long, north and south, 12 yards broad, to have 9 feet water on it, and 17 to 19 fathoms, within a distance of a few yards all around. The master of the *Windermere* places the shoal in lat. 2° 38′ S., long. 107° 13′ 30″ E.

* "Shipping Gazette," 6th June 1864.

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TREE ISLAND, distant 10 miles N.E. ¼ E. from Brekat point, and 7 miles S.W. by W. ½ W. from Gaspar island, is a barren rock, 40 feet high, with two or three trees on the summit, giving it the appearance of a ship under sail, and making it visible 15 miles. It is surrounded by a coral reef, and a rock about as high as a boat lies a third of a mile south-eastward of it. There is a cave upon this island where the Malays come to collect birds' nests, which are probably found also on the other islands.

A detached coral reef lies more than half a mile north-east of the island, and another about the same distance south-east of it; between these reefs and the one surrounding the island are narrow channels, with deep water.

GASPAR ISLAND, bears N. ¼ E. 24¼ miles from the north point of Pulo Leat, and N.E. ¾ E. nearly 17 miles from Brekat point. Its centre rises to a peak 812 feet high, which may be seen in clear weather at a distance of 30 miles, and is the principal mark for avoiding the shoals in sailing to or from the northern part of the strait. It is nearly surrounded by a reef, which projects from the south and east points of the island about a third of a mile; the west and north points are bold close-to. The soundings near the island are variable, 12 to 19 fathoms.

Water —Fresh water is to be found upon this island, but the chart does not point out the particular spot where it may be obtained.

GLASSA ROCK, 24 feet high, with some trees on it, and rocks contiguous to it, lies about a mile westward of Gaspar island. It is surrounded by a reef extending about a third of a mile south-eastward and eastward from it, but not quite so far in other directions.

Gaspar island, Glassa rock, and Tree island, from the northern limit of Gaspar strait. The Canning rock, Warren Hastings reef, Belvidere shoals, and other dangers are described in pages 296 and 297.

Tides and Currents.—It is high water, full and change, in Macclesfield channel at 2 h. 30 m., and the ordinary rise is only 4 feet. The *Vansittart's* boat is reported to have found at Tree island a perpendicular rise of 18 feet, between the hours of 8 a.m. and 5 p.m.; but there is probably some mistake in this, as 12 feet is an extraordinary rise in Banka strait, into which some very large rivers disembogue.

The currents greatly depend upon the strength of the monsoon. When the monsoon is strong, the current will generally be found setting in the same direction at the rate of 2 or 3 knots an hour, but affected somewhat by the tides. In light winds and calms the tides are seldom very regular.

Mr. Venus commanding the British Barque *Abbotsford* reports that, during the passage through Macclesfield channel in March 1869, he observed the current setting across the channel towards Pulo Leat, at the rate of 2 knots an hour, and through the Java sea at the rate of 1½ knots an hour to the eastward.

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Soundings.—The soundings, many miles to the southward of the dangers at the entrance of Macclesfield channel, vary from 11 to 14 fathoms, with an occasional cast perhaps of 10 or 9 fathoms. About 11 miles south-westward of Fairlie rock, however, they decrease to 9, 8, or 7 fathoms, and in one spot, about 1½ miles north-westward of the Blas Mateu rock, to 6 fathoms. These shoal soundings are on an extensive bank of a very irregular form, which projects from the southern part of Banka strait, across the entrance of Macclesfield channel, and then trends many miles in a south and somewhat easterly direction. Most of the southern shoals at the entrance of the strait are on this bank, and there are also a few holes in it, where the depths of water are 2 or 3 fathoms greater. In the fairway of Macclesfield channel, this bank extends 3 or 4 miles to the northward of the latitude of Shoal-water island; on either side are 11 to 15 fathoms water. In the direction of a line between Fairlie rock and Vansittart shoals, the bank extends still farther to the northward.

Northward of this bank the soundings in the fairway of the channel are 14 and 16 fathoms, deepening to 18, 20, and 23 fathoms between Vansittart shoals and George banks. Near the former the water deepens to 24 or 27 fathoms, but shoals to 15 and 11 fathoms near the latter.

The soundings are deep, but variable, 16 to 23 fathoms, pretty close to the small islands and shoals which separate Macclesfield and Clements channels. The 10-fathoms line extends some distance from Pulo Lepar, and just to the northward of Entrance point a tongue projects nearly 5 miles; from this tongue it recedes, and then passes outside Klippige shoals, close to which are 13 or 14 fathoms. The 10-fathoms line extends some 6 or 7 miles in a S. by E. direction from Pulo Jelaka. In the fairway of the channel, between Entrance point and the small islands south-eastward of Pulo Leat, are 19 to 27 fathoms, and thence, towards Pulo Jelaka and Discovery rocks, 23 to 30 fathoms. Between the latter points the soundings appear to be deeper than elsewhere in the channel, the chart showing one cast of 33 fathoms, and two or three of no bottom with 28 or 29 fathoms.

The lead will give but little warning when nearing the reefs extending from the north-west coast of Pulo Leat, close to which are 16 and 19 fathoms; but on the Banka side, between Discovery rocks and Wilson bank, it would appear from the chart that vessels may stand into 10 fathoms, or even into 8 or 7 fathoms, with safety.

In the fairway of the channel the soundings decrease, a few miles to the northward of Discovery rocks, to 29 and 27 fathoms, and abreast of Alceste rock to 18 or 21 fathoms, which depths continue as far as Gaspar island. About 10 miles East of Brekat point is a patch of 12 fathoms.

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Towards Entrance point the bottom in many places is mud, but often coarse sand with shells and stones, and in some places rock, particularly in the vicinity of the shoals on the Banka shore. Sand and broken shells with coral and mud in places appears to be the character of the bottom all over the strait; but about 5 miles N.W. by W. from the north point of Pulo Leat the bottom is black clay, good holding ground, and the depth here being no more than 17 or 18 fathoms, it is recommended as a good position for a ship to anchor, should she require to do so in this vicinity.

Directions through Macclesfield Channel from the Southward.—Proceeding towards Macclesfield channel during the south-east monsoon, having passed Two Brothers islands (page 195), steer N. by E. ½ E., or N.N.E., keeping midway between Clifton shoal and Brouwers reefs. The depths in this track are pretty regular, 10 to 15 fathoms, soft bottom. In thick weather, or if uncertain of the vessel's position the entrance of Gaspar strait should be approached with great caution, keeping a good look-out for broken or shoal water.

Be also guarded when in the vicinity of Blas Mateu rock, for although the American surveyors could not find that danger, yet, for reasons given at page 253, it would be unsafe to conclude that it does not exist. The Six-peak range (the first clump of hills to the westward of Entrance point) kept N. by W., will lead 3 miles westward of this rock, and when Baginda peak bears N.W. ½ N., and the water has deepened from 8 or 9 to 11 or 15 fathoms, steer to the north-eastward until the highest trees on Laboe or Rocky point, or Rocky point hill, are well open of Entrance point, which will lead clear of the 2½-fathoms bank.

Being 3 or 4 miles to the northward of Blas Mateu rock, a N. ½ E. course, —guarding against currents,—for 14 miles, will lead about 5 miles eastward of Entrance point, and in this track the depths will be 13 to 18 fathoms; if the vessel gets too far to the eastward the water will deepen, and if to the westward it will shoal to 12, 11, or 9 fathoms. From 5 miles eastward of Entrance point, a North course for about 16 miles, will lead nearly midway between the shoals west of Jelaka and Discovery rocks; in this track there will be from 14 to 25 fathoms till abreast Laboe or Rocky point, when there will be 23 or 24 fathoms, deepening to 30 or 33 fathoms between Pulo Jelaka and the Discovery rocks, having passed which they will decrease to 25, 19, and 16 fathoms. The vessel will now have arrived in a position with Kilapan island bearing S.W. by W., and the north point of Pulo Leat S.E. by E., and may steer N. by E. ½ E. for Gaspar island, in which track she will have 16 to 21 fathoms.

Since the survey of the sand-banks south of Banka by Mr. Stanton, it no longer appears dangerous to approach the coast to a less distance than 14 miles, and it might be convenient for a vessel to make Entrance point

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on a N. by E. or N.N.E. bearing, and pass inside the 2½-fathoms bank by keeping Rocky and Entrance points in line.*

To work through from the Southward. — During the north-west monsoon it is very difficult, almost impossible, to work through Gaspar strait, even in the latter part of the monsoon, about March, when vessels are obliged to anchor often on account of the light winds and the rapidity of the southerly current.† In the south-east monsoon, vessels will often meet with light variable winds, rendering it impossible for them to preserve a straight course.

Macclesfield channel does not afford convenient objects as marks to keep vessels clear of danger, but the following have been taken from the American chart as being, so far as we are able to judge, the best that can be given for that purpose; as, however, some of the objects are at a considerable distance from the dangers, navigators are cautioned not to depend too implicitly upon having made out, or being able to make out, such distant objects, but rather to rely upon a more general exercise of judgment, paying attention to the soundings, frequently referring to the chart, &c. It is indispensable, that the greatest vigilance be observed, and careful regard had to the set of the tides and currents, in order to work a vessel safely through this dangerous channel.

Standing to the eastward,—a vessel having passed eastward of Fairlie rock may stand on, keeping a good look-out, until she is about 2½ miles from Sand island or one mile from Branding breakers, and will have from 13 to 7 fathoms water. Sand island is just awash at high water, and Shoal-water island, bearing N.N.E. ½ E., leads a mile to the westward of the Branding breakers. Shoal-water island should not be approached nearer than 3 miles, on account of the one-fathom patch lying about 2 miles westward of it.

The Java Guide gives the following directions to clear Vansittart shoals:—

"To avoid Vansittart shoals, with a contrary wind do not bring Entrance point more to the westward than N.W. ½ N. before the peak of Saddle island bears N.E. by E., or rather keep Pulo Leat a little to the eastward

* It is to be regretted that more soundings were not obtained around, and in the vicinity of the 5-fathoms banks, because that would appear to be the safest direction to approach the strait from. The shoals at the entrance of the strait lie so far from any land, that the ship's reckoning must be relied on to avoid them, whereas if it were proved that there were no less than 5 fathoms on the banks southward of the George banks, a vessel could steer up boldly to within 7 or 8 miles of Entrance point, when a bearing of that point, or of the high land over it, and another of Baginda peak, would give her exact position.

† Seaman's guide round Java, page 306.

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of North. When near the north-west part of these shoals, the west end of Pulo Leat may be brought N. ½ W., but not more westerly, until South island is open to the northward of Low and Saddle islands. The northern extremities of these two islands, and the southern part of South island in line bearing E. by N. ¾ N., just clears the northern part of the shoals."

It appears, however, by the American chart that Entrance point bearing N.W., and the peak of Saddle island N.E. ½ E., will keep a vessel nearly 1½ miles clear of the south-west prong of the shoals. Pulo Leat a little eastward of North, seems rather an indefinite mark, unless it be known how much of the island is visible, but, taking it to mean the highest point, viz.: Putat hill, 613 feet high, and which would appear from the southward nearly in the middle of the island—it should not be brought to the northward of N. ½ E., until the peak of Saddle island bears N.E. ½ E., when it may be brought to bear North. The north extremes of Saddle and Low islands in line, bearing N.E. by E. ¾ E., leads to the northward of the shoals nearly a mile.

Being to the northward of Vansittart shoals, Low island must not be brought south of E. by S. ½ S., or Sand island west of North, to avoid the shoals between those islands; and to clear the patches lying southward of the south-east point of Pulo Leat, keep Barn island east of E.S.E., until Middle point, or Putat hill, bears N. by W. ¼ W., when Barn island may be brought to bear S.E. by E. ½ E., which will clear the reef extending from Middle point. To clear the reefs south of Pulo Jelaka, the south-east point of Pulo Leat should not be shut in by Middle point, until Pulo Jelaka bears N.N.E.; and to avoid the reefs westward of that islet, keep Middle point east of E.S.E., until Pulo Jelaka bears East. Pulo Jelaka bearing East also leads northward of Discovery rocks.

Having arrived 2 miles West of Pulo Jelaka, and to the northward of Discovery rocks, Entrance point must not be brought west of S.S.W. ¼ W., nor Rocky point west of S.W. ¾ S., until Pulo Kilapan bears W.S.W., which will lead outside the dangers extending from the north-west coast of Pulo Leat, and 1½ miles to the northward of Alceste reef, Rocky point hill in line with Tree point, S.W. ¼ S., leads about a mile north-westward of Alceste reef.

Standing to the westward,—to avoid the 2½-fathoms bank, keep the high trees on Rocky point, or Rocky point hill, well open of Entrance point, bearing N. by W. ¼ W., or keep Entrance point west of N. by W. ½ W., until Baginda peak bears W. by N., when a vessel may stand over until Entrance point bears N. by E. ½ E.

To clear Klippige shoals, do not bring Entrance point south of S.W. ¾ S., until the right extreme of Kilapan island bears N.W. by W. Rocky point,

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S.W. by W., or Pulo Jelaka N.E. by E., leads about half a mile northward of Klippige shoals.

When standing towards Discovery rocks, do not bring Entrance point south of S.S.W., or Rocky point south of S.W. ½ S., until the right extreme of Kilapan bears W. by N. ¼ N., or Pulo Jelaka, West, when a vessel will be northward of the dangers and may stand westward towards the bank into 10, or even 8 or 7 fathoms, until near Wilson bank.

The Saddles, two hills on the Banka coast, 912 feet high, bearing W.N.W., or the Padang hills W. by N. ¼ N., lead about 1¼ miles southward of the Wilson bank; and the extreme of Brekat point, N.W. by N., leads more than half a mile eastward of that danger, and will also keep a vessel clear of the elbow when standing inshore between Wilson bank and Brekat point.

Directions through Macclesfield Channel from the Northward.—In the early part of the north-east monsoon, northerly and north-westerly winds prevail about the entrance of Gaspar strait, when strong south-easterly currents will generally be experienced between Gaspar island and Pulo Leat. It appears certain that the frequent accidents happening to vessels in the vicinity of Alceste reef, arise principally from neglecting to guard against the effects of this current. A vessel, therefore, intending to proceed to the southward through Macclesfield channel, and having passed a mile or two eastward of Gaspar island, should steer to the south-westward until Gaspar island bears N. by E. ½ E., upon which bearing it should be kept until Pulo Kilapan is S.W. by W., and the north point of Pulo Leat, S.E. by E., when she will be in the fairway of the channel, and may steer South, carefully guarding against the effects of tides or currents by frequent cross bearings of the north point of Pulo Leat, Pulo Jelaka, Rocky point hill, or Kilapan island. If a South course be preserved, when Kilapan island bears West, Middle point, the south-west point of Pulo Leat, will be the breadth of Pulo Jelaka open of that islet, and Rocky point will bear S.W. by S., which latter bearing also leads close to the east side of Discovery rocks. If, when Pulo Kilapa bears West, Middle point be not open of Pulo Jelaka, the vesse: will be too far to the eastward; and if Middle point should be more than the breadth of Pulo Jelaka open of that islet, she will be too far to the westward.

If, in consequence of light or baffling winds, it be found impossible to keep Gaspar island N. by E. ½ E., but that as the vessel approaches Pulo Leat it is found to bear N. by E., or N. ¾ E., great caution must be observed in passing Alceste reef, for Gaspar island bearing N. ⅓ E. is the line of direction of that danger, and to avoid it Pulo Kilapan must not be brought westward of W.S.W., until Pulo Jelaka bears South.

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Being in the fairway, with Pulo Kilapan bearing West, and Middle point the breadth of Pulo Jelaka open of that islet, Entrance point will be just in sight, bearing about S.S.W. A vessel may continue the South course, but if there be any doubt of her position, it will be prudent to bring Entrance point S.S.W. ¼ W., which will lead through nearly in mid-channel between Discovery rocks and the dangers off Pulo Jelaka, the narrowest and most difficult part of the channel. But great care must be taken to preserve that bearing, Entrance point being at so great a distance, that any error in the bearing would be extremely likely to lead into danger. Entrance point bearing S.S.W. ½ W., leads about half a mile westward of the dangers off Pulo Jelaka, and the same point S.S.W., leads clear of Discovery rocks.

When Whitewashed point, the south-east point of Pulo Leat is open of Middle point, the ship will be southward of Discovery rocks, and if she has been steering for Entrance point, the course must be immediately altered to the south-eastward, until Entrance point bears S.W. ½ S.—which leads eastward of Klippige shoals—when a South course may be again shaped until Entrance point bears about W. ½ S.; then steer S. ½ W. for for 13 or 14 miles, or until Entrance point is about N. by W. ¼ W., and Baginda peak N.W. ¾ W., when the vessel will be in about 10 fathoms on the outer edge of the bank extending northward of Blas Mateu rock, and to clear that rock must steer about S.W. until the Six-peak range of hills on Pulo Lepar bears N. by W.; when a S. by W. ½ W. or S.S.W. course may be shaped for Two Brothers islands.

To Work through from the Northward, it will generally be advisable to get over to the westward towards the Banka shore as soon as possible, where a vessel will be more in the fairway of the channel, and will find more convenient depths of water for anchoring if it should be necessary.

If, however, when to the southward of Gaspar island, it should be found advantageous to stand well over to the eastward, it is not advisable that Gaspar should be brought more westward than N. by W. or N. by W. ¼ W., when nearing the doubtful position of Akbar shoal; and the greatest care should be observed in rounding Alceste reef, not to bring Pulo Kilapan westward of W.S.W. until Pulo Jelaka bears South.

Standing to the westward,—Tree island may be approached to about a mile, or until Gaspar island bears N.E. ¾ E., which leads that distance clear of the dangers extending from it. Brekat point bearing N.W. by N., will lead about half a mile eastward of the Elbow and of Wilson bank, and a vessel will be to the southward of those dangers when the Saddles, on Banka, bear W.N.W., or Padang hills W. by N. ¼ N., and may then stand on to the bank into 8 or 7 fathoms, until the north extreme of Kilapan

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island bears W. by N. ¼ N., which leads northward of Discovery rocks. Rocky point, S.W. ½ S., leads eastward of Discovery rocks, and also clears the shoals extending from the north-west coast of Pulo Leat.

Standing to the eastward towards Pulo Jelaka, take great care not to bring Entrance point anything west of S.S.W. ½ W. until Middle point bears E.S.E., which leads southward of the dangers off Pulo Jelaka. Pulo Jelaka must then be kept east of N.N.E., until Whitewashed point is in line with Middle point, when it may be brought to bear North. To avoid the rocks off Whitewashed point do not bring Putat hill, or Middle point, west of N. by W. ¼ W., until Barn island bears E.S.E. The east extreme of Pulo Leat bearing North will keep a vessel clear of the dangers extending from Sand island; and Sand island, if not brought to the west of N. ½ W., will clear the dangers to the southward of it and of Barn island. Saddle island in one with Low island, bearing E.N.E., leads about three-quarters of a mile northward of the northern group of the Vansittart shoals; Putat hill bearing North, or N. ¼ W., leads westward of the middle group; the same hill N. ½ E. leads westward, and Entrance point N.W. to the southward of the south-west group. Shoal-water island should not be approached from the westward nearer than 4 or 3 miles; bearing N.N.E. ½ E. it will lead a mile westward of the Branding breakers.

The Padang, Turtle, and Hancock shoals may be approached to a mile, if a good look-out be kept when in their vicinity.

Standing to the westward when southward of Discovery rocks, the right extreme of Kilapan island bearing N. W. ¾ W., or Entrance point S.S.W. ½ W., clears the northern cluster of Klippige shoals; but when Rocky point bears West, Entrance point should not be brought south of S.W. ½ S. After passing Entrance point keep the high trees on Rocky point, or Rocky point hill, open of Entrance point, or keep entrance point west of N. by W. ½ W., until Baginda peak bears W.N.W., to clear the 2½-fathoms bank.

CLEMENTS CHANNEL.

This channel is much narrower and more encumbered with dangers than either Macclesfield or Stolze channels. It is separated from the former by the four small islands, which from their appearance are respectively named Low, Saddle, Sand, and Barn, and by Pulo Leat, which form its western limit. To the eastward it is only separated from Stolze channel by South, North, and Table islands, three small islands lying close together, so that the entrances to both channels, either from the southward or the northward, are common. The entrance to Clements channel from the southward is, however, understood to lie to the westward of the Doubtful dangers

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(pages 250 to 253), Hancock and Turtle shoals, Sand island, Branding breakers, Shoal-water island, Embleton rock, and Blas Mateu shoal; whilst the entrance of Stolze channel is considered to be to the eastward of those dangers; and this order will be observed in the description of these channels.

LOW, and KLAMBOUW or Saddle are two small islands, a little more than half a mile in diameter, lying in a S.E. by S. direction about 8¾ miles from the south-eastern point of Pulo Leat. They bear E.N.E. and W.S.W., and are distant a mile from each other. Low island, the westernmost, is 123 feet high; Saddle island has two hills upon it forming a saddle, the western hill being 210, and the eastern 266 feet high. Both islands are connected and surrounded by reefs, extending nearly half a mile from them.

Dangerous Reefs.—Three dangerous patches, extending a mile in a north-west and opposite direction, lie between the bearings of E. ½ N. and N.E. by N., distant 1¼ miles from the east point of Saddle island. In the Java Guide a dry reef is said to lie 1¼ miles N.E. by E. from Saddle island, but in the American survey 6 feet water is shown on the south-east and north-west patches, and 12 feet on the middle patch. Between the reefs and the island is a narrow channel of 8 to 14 fathoms water; close to, on the outside of the reefs, are 15 to 19 fathoms.

SLEMAR or Sand Island, lying S. by E. ¾ E. 5 miles from the south-east point of Pulo Leat, is small, low, and surrounded by rocks to the distance of a third of a mile. About half a mile to the northward of it are 12 or 14 fathoms, and from 13 to 23 fathoms the same distance to the southward.

KWIL or Barn Island, lying about 1½ miles E. by N. ½ N. from Sand island, is about a third of a mile in diameter, 154 feet high, and surrounded by a reef to the distance of about a third of a mile.

The reef which surrounds Barn island is reported to dry at a distance of three-quarters of a mile in a north-easterly direction.

Between Barn and Sand islands are depths of 8 to 14 fathoms.

Dangerous Reefs, dry at low water, extend nearly 2 miles between the bearings of S.S.E. ¼ E. and S.S.W. ¼ W. from Barn island.

The British ship *Blackadder*, 1876, is said to have struck on a reef one mile N.E. ¼ N. from Barn island, from this reef Middle point bore N.W. ¾ W.; Entrance point W. by S. ¼ S.; and Sand island W.S.W.

SOUTH ISLAND, one of the islands limiting Clements channel to the eastward, lies S.E. by E. ½ E. 10¼ miles from the south-east point of Pulo Leat. It is the largest of the islands in this vicinity, being about a mile in diameter; the highest hill upon it is 200 feet high. It is sur-

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rounded by a reef extending from it in most parts about a third of a mile, but off its south end dangers project three-quarters of a mile. Close to the reef are from 5 to 14 fathoms, and 18 and 24 fathoms a short distance to the westward (*see* page 280).

KLEMAR or Table Island, lying E. by S. 1¾ miles from South island, more properly belongs to Stolze channel. It is surrounded by reefs projecting nearly half a mile from it, and in the middle of the channel between it and South island, is a 2¼-fathoms patch (*see* page 279).

NORTH ISLAND, lying 1¼ miles northward of South island, is also surrounded by a reef, which extends from it about a third of a mile. At two-thirds of a mile E.N.E. from the east end of the island is a dry bank with 16 fathoms close-to, and 12 fathoms between it and the reef extending from the island; a mile S.E. from the same end of the island is a patch of 3 fathoms. Close to the reef projecting from the west side are 5 to 9 fathoms, and 22 or 23 fathoms at a short distance from it, between it and the Sunk rock (*see* page 280).

SUNK ROCK is described in the Java Guide, page 312, as being 16 yards only in diameter, with 9 feet water on it, and 10 fathoms around it. From it Saddle island bears S. by W. ¼ W. 4¾ miles, North island E. by N. 2¼ miles, Barn island W. by S. 3¼ miles, a reef near Saddle island South, the centre of Table island and the north point of South island are in one, and Sandy island is entirely hidden by Barn island.

From its position as placed upon the American chart, the southern extreme of North island bears West, distant 2½ miles; the south-western extreme of South island S.E. by E. southerly; and the northern point of Barn island W. by S. southerly. A quarter of a mile S. ¼ E. from it is a patch of 5 fathoms, with 13 fathoms between it and the rock.

MIDDLE PASS SHOALS are three coral patches lying close together, and extending nearly a mile in a N.E. by N. and opposite direction. From their southern extreme Barn island bears S. ¾ E. 3 miles; and Whitewashed point, N.E. by E. ¾ E. 2¾ miles. Barn island, bearing S. ¾ W., leads about two-thirds of a mile to the eastward of the shoals; the southern extreme of North island S.E. by E. leads about the same distance to the north-eastward, and bearing E. by S. ¼ S., leads to the southward; the south-east point of Pulo Leat bearing W. ¼ S., leads to the northward.

CORAL BANK is a small patch just awash, with 12 to 19 fathoms around it, lying 1¾ miles north-westward of Middle Pass shoals. From it the south-east point of Pulo Leat bears S.W. by W. ½ W., nearly 1¾ miles; and Pulo Anak N. by W. ¾ W.-westerly, 2¾ miles. Whitewashed point

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bearing E. by S. ½ S., leads to the southward of the bank; and the eastern extreme of Pulo Anak, N.W. by N., leads to the north-eastward.

HEWITT SHOAL, upon which, in August 1820, the ship *General Hewitt* struck and remained fast for half an hour, lies 5 miles N. by W. ¼ W. from the western extreme of North island. When aground the western extremes of South and North islands were in one; the extremes of Pulo Leat bore from W.N.W. to W. by S. ⅛ S.; Barn island S.W. by S.; and the hill on Brekat point was well open of Pulo Leat. It is about a ship's length in extent, and 16 to 20 yards in breadth. The coral rocks were visible under the vessel with only 14* feet water over them, and near the shoal 12 to 15 fathoms.

The high part of South island open of the west extreme of North island leads westward of Hewitt shoal; and the same object open of the east extreme of North island leads to the eastward.

PULO LEAT.—The western coast of this island is noticed at page 258. The eastern coast takes a northerly direction for 3¼ miles from Whitewashed point, thence it trends about N.W. ½ N. 3½ miles to the northern point. The whole of this coast is fronted by a coral reef, which commences about half a mile northward of Whitewashed point; in front of the bay about three-quarters of a mile northward of Whitewashed point, the reef extends half a mile, but not quite so far from the eastern extreme of the island. Close to the northward of the eastern extreme, upon the dry reef extending from the shore of the island, is an islet named Pulo Anak, or Selagin.

Off the north-east of Pulo Leat, besides the reef projecting from the shore, are numerous out-lying coral patches extending nearly 2 miles from it, and rendering this part of the coast exceedingly dangerous. The north-eastern of these dangers,—which bound this part of Clements channel to the westward,—lies with the south-east point of Leat in line with the eastern extreme of the island, distant nearly 2 miles from Pulo Anak; whence the dangers take a S. ¾ W. direction until they join the reef which projects about half a mile East of Pulo Anak.

A vessel will pass eastward of these dangers by keeping Whitewashed point west of S. by W. ¼ W.; and North island bearing S.E. ¾ S. will lead to the north-eastward.

A reef, with only 6 feet water, lies off the northern end of Pulo Leat. From a position three-quarters of a cable northward of the shoal, the northern point of Pulo Leat bore S.W., and the eastern point of Pulo Anak, or Selagin, S. by E. ½ E.

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* The American chart shows 18 feet water.

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Water.—According to the American chart, fresh water may be obtained in the small bay, about half a mile to the northward of White-washed point, just where the dry reef begins to project from the shore.

AKBAR SHOAL is noticed in page 261.

MIDDLE PASS, which unites Macclesfield and Clements channels, is bounded on the south-east by Sand island, Barn island, Sunk rock, and North island; and on the north-west by the dangers projecting from the southern end of Pulo Leat and Middle Pass shoals.

To proceed from Macclesfield channel through Middle pass from the south-westward, steer between Entrance point and Vansittart shoals towards Sand island, the channel between which and the shoals extending from the southern end of Pulo Leat, is clear, with depths of 14 to 20 fathoms; Entrance point kept bearing W. by S. ¾ S., will lead through in mid-channel.

In the event of meeting with baffling winds, so that the vessel cannot preserve a straight course, the following may prove useful:—The east extreme of Pulo Leat bearing North, clears the dangers extending from the west side of Sand island; the north extreme of Barn island bearing East, clears the dangers extending from the north side of Sand island; Barn island E.S.E. clears the shoals projecting from the southern end of Pulo Leat; Middle point of Pulo Leat W.N.W., clears Middle Pass shoals; and the north extreme of Barn island S.W. by W. ¾ W. leads north of Sunk rock.

The CHANNEL between LOW ISLAND and SAND ISLAND is narrowed to the breadth of 1½ miles by the shoals extending to the southward of Barn island. It is not easy to see what advantage is to be gained by using this channel, but if it be desirable a vessel may proceed through in safety with North island bearing N.E. by E., in mid-channel in 20 fathoms water, and when the west extreme of Saddle island bears S.S.E., which leads eastward of the shoals south of Barn island, a course may be shaped to the northward.

The CHANNEL between VANSITTART SHOAL and LOW ISLAND is 2 miles wide, and may be used by bringing Sand island to bear N.N.W., which will lead through in mid-channel. As the north-eastern prong of Vansittart shoals is approached, take care that Sand island is not brought at all to the northward of N. by W., when the south point of Saddle island comes in line with the north point of South island. The dangers extending from Low island will be avoided if Sand island is not brought west of N.N.W. ½ W.

Directions through Clements Channel from the Southward.—Proceeding through Clements channel from the south-

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ward, having passed Fairlie rock, steer about N. by E. or N. by E. ½ E., if the vessel has passed on the south side of the rock, or about N.E. by N. if she passed on the north side. When the summit of South island is made out, bring it to bear N.N.E., which will lead between Embleton rock and Vansittart shoals; take care however not to mistake South island, remembering that Low and Saddle islands will be seen to the westward of it. Low island bearing N.N.E. leads over the south-eastern prong of Vansittart shoals.

Approaching South island on a N.N.E. bearing, the soundings will be 9 to 13 fathoms until well up with Low island, when they will deepen to 16 and 18 fathoms, and to 24 or 25 fathoms when abreast of Saddle island. When Saddle island bears West, steer N. by W., which will lead more than a mile clear of the reefs off the north-eastern end of Saddle island, and midway between North island and Sunk rock, and in this track the soundings will be 22, 24, 17, 24, and 23 fathoms. When the north extreme of North island bears East, steer N.W. by N. for 5 or 6 miles to pass between Middle Pass shoals and Hewitt shoal, in depths varying from 22 to 32 fathoms; when Whitewashed point bears about W.S.W., a N. ¾ W. course may be shaped for Gaspar island.

To pass westward of Sunk rock, keep the summit of South island N.N.E., until Saddle island bears W. by S., when steer N.W. ½ W., which will lead clear of the shoals north-eastward of Saddle island, and between Sunk rock and Barn island. Saddle island S. ½ E. leads midway between Barn island and Sunk rock, and between Middle Pass shoals and Hewitt shoal.

Working through.—No vessel would from choice attempt to work through Clements channel, as Macclesfield and Stolze channels are much better adapted for that purpose; but it is possible that a vessel, embarrassed by light baffling winds, may find it convenient to proceed through some part of this channel, and it is with this view that the following directions are given.

Directions have been already given (at page 264) for passing westward of Fairlie rock. To clear the south-eastern prong of Vansittart shoals, do not bring South island east of N.E. by N., nor Low island east of N. by E. ½ E. When the highest of the hills on Pulo Lepar—seen left of Entrance point—bear W.N.W., a vessel will be northward of the south-eastern prong, and may stand on until Low island bears N.N.E. ½ E., which leads eastward of the middle and northern patches. Standing towards Low and Saddle islands, keep the south-east extreme of South island north of N.E. To clear the southern and eastern sides of the shoals lying off the north-east end of Saddle island, do not bring the south point of Saddle island south of West, nor the west extreme of North

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island east of N. by E. ½ E.; the north point of Barn island, if not brought north of N.W. by W. ¾ W. will clear them to the north-eastward; the south point of South island bearing E. ½ N. clears them to the northward; and the eastern extreme of Saddle island bearing South clears them to the westward.

When standing towards the shoal patches, extending southward from South island, keep the west extreme of North island open of the west extreme of South island, bearing North. As South island is neared, the west extreme of North island must not be brought north of N. ¾ E., to clear the dangers extending a short distance from South island. As North island is approached, the west extreme of South island not brought to the south of S. by E. ¾ E., will clear the dangers extending from North island. The south-west extreme of South island bearing S.E. leads north-eastward of the Sunk rock; and bearing E.S.E. leads south-westward; the east end of Saddle island S. by W. ½ W. leads eastward of the rock, and bearing South leads westward.

Standing towards the shoals extending southward of Barn island, the west end of Low island must not be brought eastward of South. Barn island S. ¾ W. leads eastward of the Middle Pass shoals; and the peak of South island S.E. ¼ E. leads north-eastward of them, and of the Coral bank. The peak of South island open of North island S.S.E. ¼ E. or S.S.E. ½ E., leads westward of the Hewitt shoal; and the eastern extreme of South island just open of the eastern extreme of North island, leads to the eastward. In standing towards Pulo Leat, when a mile or two northward of the Coral bank, the south-east point of Leat should not be brought south of S.S.W. ¼ W., to avoid the dangers extending from the shore. The north-eastern coast of Leat must not be approached nearer than 3 or 4 miles; North island bearing S.E. by S. will lead north-eastward of the dangers projecting from that coast, as will also the hill on Brekat point bearing N.W. by W.

Directions through Clements Channel from the Northward.—For the convenience of navigators, the directions for proceeding through this channel from the southward, with a fair wind, are here reversed; but, for working through, it will not be necessary to give other directions than those just given, which are, in fact, merely the bearings of objects to avoid the various dangers, and equally apply to vessels proceeding in either direction.

Having passed a mile or two eastward of Gaspar island, steer to bring it N. by W., and kept on that bearing steering S. by E. it will lead clear of the dangers lying off the north-east coast of Pulo Leat. When the north extreme of Pulo Leat bears West its south-east extreme should bear S.W. by S. Continue the S. by E. course until the

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south-east extreme of Pulo Leat bears W.S.W., when Saddle island should be seen just on the starboard bow with Barn island and Low island to the right of it; South island should be about two points on the port bow with North island close to the left of it. The west extreme of South island, S.E. by S., will lead between Sunk rock and the dangers extending from North island. When the north point of North island bears East, steer S. by E. to pass between South island and the shoals off the north-east end of Saddle island; and when the south extreme of Saddle island bears West, bring the peak of South island N.N.E., and keeping it on that bearing will lead between Embleton rock and Vansittart shoals.

If intending to pass westward of Sunk rock, preserve the S. by E. course until the south-east extreme of Pulo Leat bears West, when Saddle island should bear or must be brought to bear S. $\frac{1}{2}$ E., which leads between Sunk rock and Barn island. When North island bears E. $\frac{1}{2}$ N., steer S.E., taking care that the north end of Barn island is not brought to the north of N.W. by W. $\frac{3}{4}$ W., to clear the dangers north-eastward of Saddle island; when the peak of South island bears N.N.E., steer S.S.W., and proceed as before.

STOLZE CHANNEL.

Stolze channel is rather wider, less encumbered with dangers, and furnishes objects more convenient for guiding vessels safely through it, than Macclesfield channel. The southern entrance is 15 miles broad, bounded on the west by Larabe shoal, and the dangers described in page 250, and on the east by Carnbee rocks, Anvangs bank, Cooper, and Three-feet shoals. These latter shoals are very much against this channel in making it from the southward, for Carnbee rocks—the most southern of the dangers—are 20 miles distant from the land, so that in thick or hazy weather, when a ship might be uncertain of her exact position, she would not be able to make Billiton island with nearly the same safety that she would be able to to make Pulo Lepar or the south coast of Banka. These shoals would appear to form the only drawback to the adoption of this channel, and in fine weather, even this would almost disappear, for the hills on Billiton are high, and may be seen at a distance of 30 or 35 miles. Upon the American chart is a view taken from a position near the Carnbee rocks, from which it appears that when in the vicinity of these dangers, not only are hills on Billiton clearly distinguishable, but Kennedy and Otan islands are well in sight.

CARNBEE ROCKS in lat. 3° 33′ 15″ S., long. 107° 39′ 40″ E., are of coral formation, 400 yards long in a north and south direction, and 300 yards broad; these rocks are covered at high water, but a portion dries 5 feet at low water; with depths of 12 to 15 fathoms, one cable from them.

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These rocks are difficult to distinguish at high water when the water is smooth, from a distance of more than one cable.

ANVANG BANK, discovered in 1822 by Lieutenant J. Stolze, is half a mile in length W. by N. ½ N. and E. by S. ½ S., and about a cable broad. It consists of large black rocks, some of which are visible at low-water springs; close to them are 5 to 13 fathoms, and about 1½ miles westward of them are 22 fathoms. From the western extreme of the bank, Gunong Bolo, on the south point of Pulo Selio, bears N.N.W. ¾ W. 10½ miles, and Blantoe hill N. by E. ½ E.

A rock above water, named Karang Naga, is marked on the Dutch chart for 1863, at 3½ miles S.S.E. of the Anvang bank.

COOPER SHOALS, lying N.N.W. ¼ W. 2½ miles from Anvang have only 2 feet water over them, and 7 to 10 fathoms close-to. Gunong Bolo bears from them about N.W. by N., and Blantoe hill N.N.E.

THREE-FEET SHOAL is a patch having only 3 feet water over it and 10 to 13 fathoms around it, lying N.W. by W. ¼ W. 4¾ miles from Cooper shoals, with Gunong Bolo bearing N. ½ W. 4½ miles, and Blantoe hill N.E. ¼ N. 13¼ miles.

MASAR or Kennedy and Otan Islands.—Kennedy is a small island, lying 7 miles to the north-east of the Anvang bank. There is a small islet at three-quarters of a mile to the north-west of it.

Otan is rather smaller than Kennedy island, and lies about 1¾ miles E.S.E. from it.

Other dangers and islands lie to the southward of Billiton, but as they are to the eastward of the track of vessels bound through Gaspar strait, they are included in the description of Carimata strait (page 306).

The West Coast of Billiton, forming the eastern limit of Gaspar strait, is fronted by numerous islands, separated by narrow, and for the most part, unnavigable passages. Pulo Selio, with the dangers westward of it; the group named the Six islands; and Pulo Mendanao, the largest of the islands, form the eastern limit of Stolze channel.

Hills on the Coast.—At the south-west end of Billiton are the Haycocks, two remarkable hills, 496 feet high, which when coming from the southward, appear as islands. At 5 miles north-eastward of the Haycocks is Blantoe hill, 1,166 feet high; and to the eastward of Blantoe are Luda, Pyramid, and South peak, all of which serve to determine a vessel's position when approaching the strait from the southward.

At 7 miles northward of Blantoe are Kliang, 1,198 feet, and Nose 1,090 feet high; 10 or 11 miles N. by E. from Blantoe, is Agong, 1,242 feet high, and which appears to be the highest hill on the island. At 7 miles

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northward of Agong, in lat. 2° 53′, is Tadjem, 1,096 feet high. The whole of the hills just mentioned are visible from the southward and south-westward. At 3 miles S.S.E. ½ E., from Tanjong Bienga, a high bluff forming the north-western extremity of Billiton, is Gunong Tebalo, the highest part of which, Round Mount, is 541 feet high.

PULO SELIO, which has a conspicuous hill, 242 feet high, upon it named Gunong Bolo, is surrounded by a reef, and separated from the south-western point of Billiton by a narrow channel having in the middle the small island of Sariboe; a mile south-eastward of Sariboe is a reef which partly dries. Close to the shore of Billiton are the small islands Goenting and Proet.

WHITE ROCK, 28 feet above water, stands on the outer edge of a rocky patch, lying nearly 3 miles W. ¼ N. from the south point of Selio; a mile S.E. by E. from it are some rocks above water. There is no channel between White rock and Selio, and shoal water extends nearly 1½ miles southward of that island.

A SHOAL, about a third of a mile in extent, having but 1½ feet of water over it, and 10 to 16 fathoms close-to, lies N.W. nearly 2 miles from White rock. Between this shoal and White rock, and between both and Koerier bank are channels of 5 to 8 fathoms water.

KOERIER BANK, of sand, about a mile long and a quarter of a mile broad, dries at low water at 3 miles North of the White rock, and 4 miles West of the north point of Pulo Selio.

Water.—A little to the northward of Tamelang point, on the south-west side of Billiton, there is a small rivulet of good water, which may be easily approached by boats.

Fresh water is also to be found in the northern part of the bay on the west side of Selio.

Anchorage.—The 3-fathoms edge of the bank surrounding Selio forms a sort of bay on the west side of that island, where a vessel may anchor to fill up water. The entrance to it is between the 1½-feet shoal and the Koerier bank; Gunong Bolo bearing S.E. by E. ½ E., will lead into it, midway between those dangers. The anchorage nearest to the watering place, is in 6 or 7 fathoms, bottom of sand and shells, with White rock bearing S.W. ½ S., and the south extreme of Selio, S.E.; no vessel should venture farther in. If an anchorage farther out should be preferred, it may be taken anywhere with White rock bearing from S. by E. to S.W. ½ S.; and the south extreme of Selio from E.S.E. to S.E. by E.

In entering or leaving the bay take care not to bring the south extreme of Selio east of E.S.E., as that bearing only just clears the 1½-feet shoal,

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and the same point must not be brought south of S.E. ½ E., to avoid the Koerier shoal.

Foul Ground and Shallow Water extends to the westward from Billiton nearly to a line drawn from White rock to Ross island, the most southern of the Six island group; within this line 2½ miles N. by W. ½ W. from Koerier bank, is Gull rock.

The large bay to the northward of Selio, and eastward of the Six islands, is crowded with small islands and reefs; most of the latter, as far as Roe point, dry at low water, and the pilots who were accustomed to these shores refused to go in there even with the boats.*

The SIX ISLANDS, named Pulo Lima by the natives, are small, low, and surrounded by reefs, between which are narrow passages having depths of 10 to 20 fathoms water. The southernmost of these islands, named Ross, after Captain Ross, I.N., is 42 feet high. The others are named Benolo, 94 feet high; Kasenga, 58 feet; Bago, 146 feet; Betong, 170 feet; and Binget, 158 feet high. They may be approached to the southward and westward as near as one mile; but dangerous patches extend from Ross island in a south-east direction for nearly 2 miles; and from Kasenga, the north-western island, reefs, some of which dry at low water, extend in a N.N.W. direction to the distance of 1¼ miles, and for three-quarters of a mile in a southerly direction. The western extreme of Mendanao bearing North a little easterly, leads close to the reef extending N.N.W. from Kasenga, and bearing N. ¼ E. or N. ⅓ E., clears all dangers near the Six islands.

REEFS.—A reef having 9 feet water, lies W. by N. ½ N. nearly 4 cables from Ross island, with Benolo island bearing N. by E., and Kasenga island N. ¾ W.; there is also a reef with 5 feet water lying N. by E., 1½ miles from Kasenga island, from the centre of this reef, the north point of South island is just open north of Table island bearing W. by N. ¼ N., and Ross island is just open of the west point of Benolo island bearing S. by E.†

KLEMAR or Table Island, 116 feet high, forms the western limit of the narrowest part of Stolze channel, the reef extending N.N.W. from Kasenga, forming the eastern limit. The island is about a third of a mile long N.N.W. and S.S.E., and nearly a quarter of a mile broad. It lies nearly 2 miles E. by S. from South island, and from its isolated position, serves as an excellent mark to guide vessels in steering for the narrow part of Stolze channel when approaching it either from the

* Seaman's Guide round Java, page 313.

† The English barque *Dunkeld* is said to have been lost on a rock lying one mile S.S.W. from Ross island, 11th August 1876. As no rock was previously known to exist in that position, this report requires confirmation.

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southward or from the northward. It is surrounded by a reef to the distance of nearly half a mile, and at two-thirds of a mile S.W. of it is an outlying patch of 3 fathoms. This patch was unsuccessfully searched for in the Hydrograaf, 1876. (*See* page 271.)

Near the south-east end of Table island lie two reefs about 2 cables apart, with 8 to 9 fathoms water between them, the eastern reef having 18 feet on it, from which the south point of Table island bears N.W. ½ W., about 4½ cables, and the western reef 14 feet, with the south point of the island N.N.W. ¾ W. westerly 4¼ cables.

A sand-bank with 7 fathoms water, and 19 fathoms close to its extremity, extends about 3 miles to the southward of Table island.

SOUTH ISLAND is about four times as large as Table island, and a hill on its northern part is 200 feet high. It is bordered by a reef, and dangers extend three-quarters of a mile in a southerly direction from its south point. On its north side are some rocks not far from the shore, and a patch with only 3 feet water over it lies half a mile N. by W. from its eastern point. (*See* page 270.)

A 2¼-Fathoms Patch lies nearly in mid-channel between Table island and South island, which makes that passage dangerous; elsewhere are soundings of 14 to 21 fathoms.

NORTH ISLAND, 240 feet high, is separated from South island by a channel 1⅛ miles wide, which, from the reefs projecting from both islands, is narrowed to three-quarters of a mile. The channel is clear, with soundings of 7 to 18 fathoms. The two islands are in one on a N. by W. and opposite bearing, but North island is the smaller of the two. Reefs and rocks extend about a third of a mile off the southern side of North island, and the same distance off its north-eastern point. Three-quarters of a mile E.N.E. from the north-east point, is a dry patch; there is also a patch of 3 fathoms lying S.E. ¼ E., distant a little more than half a mile from the same point. (*See* page 271.)

PULO MENDANAO, or Long Island, lying 15½ miles to the eastward of Pulo Leat, is much the largest of the numerous islands which front the west coast of Billiton. It is about 8 miles in extent north and south, and about the same distance east and west, so that Long island does not correctly designate its shape, but it is probable that Pulo Gala to the southward, and Pulo Batoe Dinding to the northward, were formerly supposed to be a part of it, and from this cause it may have obtained its name. The island is for the most part low, but has some hills 600 to 700 feet high upon it. Its western extreme, named West point, projects considerably from the main body of the island, and there is a small hill near its extremity.

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PULO AYAM, is a very small islet, lying S.S.E. 2½ miles from West point.

There is a rock on the outer edge of the reef extending from Mendanao, from which the south point of the island bears E. ½ S. 2¾ miles, and Pulo Ayam N.N.W. ¾ W. At three-quarters of a mile from the rock in the direction of Pulo Ayam is a dry patch.

PULO GALA, or Low Island, lies off the south-east coast of Mendanao, from which it is separated by the Nado passage, about three-quarters of a mile broad.

Buoy.—In the channel formed by Pulo Gala on the west, and Mendoelok, Keringgan, and Roe islands on the east, a white buoy is moored in 5 fathoms, (near a reef which dries, on the east side of the channel) with the north point of Mendoelok bearing E. by S. southerly; south-west point of Mendoelok S.S. ½ E.; and the north-west point of Keringgan N.E. ½ E.

Sikindang, La, and Hoorn or Sebongkok are small islands lying between the east coast of Mendanao and Billiton. Hoorn island is connected to Mendanao by a reef.

NADO PASSAGE, between Pulo Mendanao and Pulo Gala, is said to be (page 314 of the Java Guide) entirely clear, and very deep. The American survey of 1854 also shows the channel to be clear—but in the Dutch chart for 1863, both the channel and its southern entrance is completely barred by rocks.

BROWN REEF.—The English barque *Victor*, when proceeding through Stolze channel, struck on a rock with only 8 feet water on it, and 14 fathoms close-to, Pulo Betong (the easternmost of the Six islands) bearing S.S.E., and Table island W. ½ S. These bearings would place this reef near the position of a danger named Brown reef on the Dutch chart.

Caution.—As there appear to be other dangers besides Brown reef in this locality, a vessel will do well not to pass eastward of a line drawn between Kasenga island and the West point of Mendanao.

HOOG Island, or Pulo Kumbong, is a small islet, 100 feet high, and in the form of a sugar loaf, lying nearly 1½ miles to the northward of West point; a reef surrounds it, which on the eastern and northern sides projects nearly half a mile.

PULO BATOE DINDING lies off the north coast of Mendanao, from which it is separated by Nassi channel three-quarters of a mile broad. On the western side of the island is a deep bay, but it is quite filled up with coral shoals. Half a mile off the north-eastern end of the island is a small round islet.

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Nassi channel is navigable for small vessels only, owing to its being barred at either end ; on the bar there are but 2 fathoms water, in the rest of the channel 5 to 9 fathoms.

LANGGIR or Rotterdam Island, lying about 1¼ miles northward of the south-west point of Batoe Dinding, is small, and more than half a mile west of it is a very small islet, half a mile south-west of which are some rocks. A bank of sand and rocks surround both island and islet, between which and the reef extending from Batoe Dinding is a narrow channel with 6 to 9 fathoms water in it.

Caution.—The whole coast between Mendanao island and Tanjong Bienga, the north-west point of Billiton, is fronted by dangers, and vessels should use extreme caution in approaching it ; the outlying dangers only will be described.

KARANG SELAT, or Perlak Shoal, is a rocky shoal nearly awash, with a 2-fathoms patch about a third of a mile northeastward of it. From this shoal the two north points of Batoe Dinding are in line, bearing W. ¼ S. ; the eastern extreme of Hoorn island S. by E. ¼ E. ; and Pulo Kalmanbang E. ¾ N.

A black buoy lies on the north side of Karang Selat, in 6 fathoms, with a conspicuous tree on Pulo Kalmanbang bearing E. ¼ N., and the northeast corner of Hoorn island, S. by E. ¼ E.

PULO KALMANBANG is a small island lying E. ¼ N. 6¾ miles from the north-east point of Batoe Dinding. It is surrounded by an extensive reef, and just outside the edge of this reef, at half a mile from the western shore of the island, is a small coral reef named Karang Djoeningin, on the west side of which a white buoy is moored in 6 fathoms, with the east point of Hoorn island bearing S.S.W. ½ W. westerly ; south extreme of Pulo Kalmanbang E. ½ N. ; and north extreme of Pulo Kalmanbang N. E. ½ E.

An extensive shoal, named Pinang, lies off the south and south-east sides of Kalmanbang, distant 1½ miles from it ; and there is another named Toekoel, which dries at low water, to the north-westward of the island, the outer edge of which is distant from it 1½ miles. Rocks lie off the northeastern end of this latter shoal, the outer rock being nearly 2 miles distant from Kalmanbang.

A white buoy is moored in 8 fathoms, on the northern edge of Toekoel shoal, with the east point of Hoorn island bearing S.S.W. ½ W. westerly ; west extreme of Pulo Kalmanbang S. ¼ E. ; and east extreme of Pulo Kalmanbang S.S.E. ½ E.

TIEROETIOEP BAY and RIVER.—This bay is to the northward of Pulo Kalmanbang and Toekoel shoal, between the latter and

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Karang Panjang or Bakka shoal. Tieroetioep river falls into the eastern part of the bay, but reefs extend off its entrance to a distance of nearly 4 miles. The entrance of this river is marked by a cone, and by ball beacons.* The small island of Kalmoa, 150 feet high, lies directly off the entrance, 3 miles within the reefs; on the north side of the island stands a white pyramidal beacon, visible from a distance of 12 miles.

A red buoy is moored in 8 fathoms about 50 yards to the eastward of a small coral reef near the middle of Tieroetioep bay, with the east point of Pulo Kalmanbang bearing S. by W. ½ W.; Tanjong Tikar S.S.E. ½ E. easterly; and Kalmoa E.S.E. southerly.

A black beacon buoy lies on the southern edge of the shoal on the north side of the channel leading to Tieroetioep river, with the beacon on Kalmoa island bearing S.E. by E. distant 2 miles.

The outer edges of the reefs which lie on either side of the entrance of the river form a sort of bight, within the horns of which a vessel may anchor in 6 or 7 fathoms. The best anchorage appears to be a little farther out with Kalmoa island bearing about E.S.E., and Kalmanbang island S. by W. ½ W.

The Java Guide, however, states that "The bay of Tieroetioep affords no safe anchorage in the north-west monsoon, and even during the north-east monsoon there are heavy gales from the north-west. It is advisable to lay the kedge out to the northward, as vessels often foul their anchors, either by the currents or winds. To enter and anchor in this bay, having passed the West point of Mendanao at a distance of 2 miles, steer North or N. by E. till Rotterdam island, or the north-west point of Pulo Batoe Dinding, bears S.S.E., then steer N.E. by E., E.N.E., or E. by N., till Kalmoa island bears S.E. by E.; steer then direct for that island till Kalmanbang bears S.S.W. ¾ W., and anchor in 7½ fathoms with the mouth of the river S.E. by E. ½ E., 4 miles distant, and the nearest rocks S.E. ¾ E., 3 miles." By the American chart, Kalmao bearing S.E. by E. leads just to the southward of the Bakka shoal.

When near the north-west point of Dinding, the wind sometimes shifts to the eastward; and if bound to this bay it is better to anchor and wait for the sea breeze from the southward or south-westward, as the current runs to the north-west with an easterly wind.

Water.—The water, which is fetched from a little way up the river, is very good; it may be procured also on the right bank of the river, near the entrance, but it is not so good.

KARANG PANDJANG, or Bakka Shoal, bounding Tieroetioep bay to the northward, is about three-quarters of a mile in extent,

* It is proposed (1877) to replace the outer beacon with a black and white buoy.

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with 1½ fathoms water over it, and 6 fathoms close-to. Tanjong Koeboe, on Billiton, bears from it E. by S. ¼ S.; Kalmoa island S.E. ½ E.; and Kalmanbang S. by W.

ARGO SHOAL, about 1¼ miles in extent, with only a foot water over the middle of it, lies N.N.E. ½ E. 4½ miles from Karang Pandjang, and from its outer edge Tanjong Bienga bears N.E. ¾ E.; Round mount E. ½ S.; and Tanjong Koeboe, on which are some high trees, S. by E. ½ E.

On the American chart it is remarked that several shoals are reported to lie westward of Argo shoal.

TWO-FATHOMS PATCH.—A small shoal, with this depth of water over it, lies 1¼ miles N.E. ½ N. from Argo shoal; with Tanjong Bienga bearing N.E. by E. ½ E., distant 2 miles; and N.W. island N. ½ E. 3½ miles.

TANJONG BIENGA is a high bluff point, forming the north-western extreme of Billiton; from this point the coast trends to the north-eastward.

ELEVEN ISLANDS are a cluster of small islands lying off the north-western extreme of Billiton. The names of some of them are Sailors Hat, Bamboe, Sampit, and Boerong; the latter is the largest of the group, and lies N.N.E. nearly 2 miles from Tanjong Bienga.

N.W. island or Langwas, the outer and most north-western of the islands, lies just inside the edge of the coral reef which extends from the shore and surrounds the entire group. Its north end is in lat. 2° 31½′ S., long. 107° 38¾′ E.

ALWINA SHOAL.—The ship *Alwina* passed close to a rock lying N.N.W. 1½ miles from the north-westernmost of Eleven islands. It appeared to be a detached danger, with a depth of 6 to 9 feet on it, and deep water all around.*

Soundings.—No soundings appear on the charts for a distance of 7 or 8 miles southward and south-westward of Carnbee rocks, (page 276) nor yet close to those dangers, so that a vessel cannot be guided by the lead when approaching them. Between Carnbee rocks and Anvang bank are 13 to 18 fathoms. Anvang bank, Cooper shoals, and Three-feet shoal appear to lie just within the edge of the line of 10 fathoms, running from a position 4 or 5 miles south-eastward of Anvang bank, outside the shoals just mentioned.

In the fairway of Stolze channel, from Carnbee rocks to Pulo Selio, the soundings are 14, 19, 23, and 25 fathoms; towards the eastern side of the channel they are deeper, 26 to 30 and 34 fathoms, decreasing suddenly

* "Mercantile Marine Magazine," November 1858. On the chart this danger is placed 1¼ miles N.W. ½ N. from N.W. island.

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towards the 10-fathoms line from a depth of 20 or 23 fathoms, near Cooper shoal and Anvang bank ; and from 30 or 25 fathoms, near the Three-feet shoal and the southern end of Pulo Selio.

Towards the shoals on the western side of the entrance to the channel the depths are much less, and they decrease more regularly, the 10-fathoms line extending some 5 or 6 miles to the eastward of them, so that they may be approached by proper attention to the lead. Near the shoals extending from Shoal-water and Hancock islands, and near Bliss shoal, the 10-fathoms line extends only a little more than half a mile to the eastward, and consequently those dangers must be approached with greater caution.

Between White rock and Table island, in the fairway of Stolze channel, the soundings vary from 23 to 27 or 28 fathoms, with perhaps an occasional cast of 19 or 20 fathoms ; and they are also in this part of the channel deeper on the eastern side, and shoaler on the western side, than in the fairway.

A bank, with 8 to 11 fathoms over it, extends 3½ miles S. by E. from South island.

A mile eastward of Table island are 11 and 14 fathoms, with irregular soundings 18 to 30 fathoms in the fairway of the narrowest part of the channel. From Table island northward to the West point, Pulo Mendanao, are 30 or 25 fathoms, with perhaps a cast now and then of 16 fathoms abreast of North island, and of 19 or 20 fathoms abreast of the West point Thence to Gaspar island are 27, 25, 20, 19, 16, and 14 fathoms; and to the eastward of Akbar shoal 26, 29, 25, 20, and 18 fathoms.

The bottom through the entire length of Stolze channel appears to be composed principally of sand and broken shells, with here and there broken coral. To the north-westward of Billiton the bottom is mostly soft, black mud, with sand and broken coral and shells in places.*

Directions through Stolze Channel from the Southward.—As soon as Blantoe—the highest hill on the south coast of Billiton—can be recognised, it should be brought to bear about N.N.E., and with it just in sight on that bearing, if the weather be clear, a vessel will be about 33 or 35 miles distant from it, in the fairway of Stolze channel, with Carnbee rocks about 15 miles to the north-eastward, and may

* "Stolze channel is easy for a stranger ; but the nature of the bottom, and the depth of water in it is against anchoring, in the event of calms or thick weather. North of Gaspar strait we always found a soft bottom, whereas in Stolze channel, besides the inconvenient depth, it is of rock or coral : the strength of the current probably prevents the accumulation of mud. Hoog island, off the north-west coast of Mendanao, shows conspicuously, and is a good distinguishing mark ; at night we found it an easy object to see."—Captain the Hon. C. G. J. B. Elliot, C.B., H.M.S. *Sybille*, 1855.

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shape a course North or N. ½ W. As the vessel proceeds to the northward, Luda hill will come in sight, and shortly afterwards Pyramid and South peak, all of which will be seen to the right or eastward of Blantoe. Soon the Haycocks will be visible, at first a little to the left of Blantoe, and by the time they are in line with it, Gunong Bolo, on the south end of Pulo Selino, will be well in sight, bearing about N.N.E., and distant 14 or 15 miles. Shoal-water island will also be in sight, not perhaps from the deck, but from the mast head or a little way up the rigging, bearing N.W. by W., and distant 15 or 16 miles.

From this position a N. by W. ¾ W. course will lead up to Table island, passing 6 or 7 miles westward of White rock, and 3 or 4 miles westward of Ross island. When abroast of White rock, Saddle and South islands will be seen on the port bow; soon Low island will also rise in sight on the port bow, and the Six islands on the starboard bow; and as they are approached—if the N. by W. ¾ W. course has been preserved—Table island will be seen right ahead in mid-channel.

Table island should be approached on a N. by W. ¾ W. bearing until West point, Pulo Mendanao bears N. by E. or N. by E. ¼ E., which will will lead between Table island and the reefs extending N.N.W. from Kasenga. When the north point of North island bears W.N.W., either steer N.N.W. for Gaspar island, which will lead 3 miles eastward of Hewitt rock and 2 miles westward of the western of the two positions ascribed to Akbar shoal; or bring North island S. by W. ¾ W., and steer N. by E. ¾ E., or N.N.E., which will lead 4 or 5 miles westward of the dangers extending from Rotterdam island, and into the China sea eastward of Akbar shoals and Canning rock.

Working through from the Southward.—When standing to the eastward,—to avoid Carnbee rocks, Blantoe hill must not be brought north of N. by E.; and to clear Anvangs bank and Cooper shoals, Gunong Bolo must not be brought west of N. by W. When Blantoe bears N.E. ¾ N., or the Haycocks N.N.E. ¾ E., Gunong Bolo must be kept east of N. by E., to avoid the Three-feet patch.

The dangers southward of Pulo Selio should not be approached under a depth of 10 fathoms, or White rock brought to the west of N. by W. ½ W.; and when Gunong Bolo bears N.E. by E. ½ E. White rock must be kept to the east of North, to avoid the edge of the bank which lies S.S.E. nearly a mile from it. White rock should not be approached nearer than a mile, nor to a less depth than 14 or 13 fathoms; when northward of White rock, it must not be brought anything south of E.S.E. until the north point of Pulo Selio bears E. by N. ½ N., to clear the 1½-feet patch lying nearly 2 miles north-west of it. Koerier bank should not be

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approached under a depth of 10 fathoms, or White rock brought south of S.E. by S.

Gunong Bolo kept east of S.E. by E. will lead clear of Koerier bank, and to the south-west of the foul ground between it and the Six islands. Ross island bearing N.N.W. ¼ W. leads westward of the foul ground, and also clear of the dangers lying south-east of Ross island. Kasenga bearing North clears the dangers extending from the west side of Ross island; and the hill on the West point of Mendanao, if not brought to the north of N. ½ E., will lead well clear of the rocks which extend more than a mile N.N.W. from Kasenga, and will also clear all danger contiguous to the Six islands. When Table island bears W. by N. a vessel will be northward of the dangers extending from Kasenga, and may stand eastward until the hill on the West point bears N. ¼ W. (*see* page 280).

As Pulo Ayam is neared, the hill on West point must not be brought to the west of North, and the islet must not be approached nearer than a mile, or the extreme of West point brought to the west of North. To clear the dangers about Hoog island, West point should not be brought to the south of S.S.E. until Rotterdam island bears N.E., when Hoog island in line with West point bearing South, will lead clear of the dangers westward of Rotterdam island. Rotterdam bearing S.W. leads clear of the shoal bank extending from the north point of Batoe Dinding.

The dangerous coast of Billiton northward of Mendanao should not be neared under 5 or 6 miles; the summit of the north range of hills on Mendanao S.S.W., or Taling, the highest hill on Mendanao, on the same bearing will lead well clear of all danger. N.W. island and Boerong island should not be approached nearer than 2 miles, and caution must be observed to avoid the position of the Alwina shoal (*see* page 284).

When standing to the westward, Shoal-water island, if not brought to the east of North, will clear all danger from Larabe shoal to Middle reef, and the lead will also give good warning when standing towards them, as they lie some 4 or 5 miles within the edge of the 10-fathoms line. Shoal-water and Hancock islands must be approached with caution, as the lead does not give much warning when nearing their ledges; they should on no account be approached under a depth of 10 fathoms, or within 2½ miles. Hancock island bearing South leads clear of Bliss shoal, between which and South island a vessel may stand to the westward until the summit of South island bears N.E. by N., which will lead clear of Vansittart shoals and the dangers about Saddle and Low islands.

Saddle island bearing W. ½ S., leads southward of the dangers extending from South and Table islands. When near Table island, its south point should not be brought to the eastward of North, to avoid the 3-fathoms patch lying nearly three-quarters of a mile south-west of it

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The east side of Table island may be approached to a mile ; but the east side of North island has dangers lying nearly a mile off it, and to clear them Table island must not be brought eastward of S.S.E. The east extreme of South island just open of the east extreme of North island bearing S. by E., leads a mile eastward of Hewett shoal.

Directions through Stolze Channel from Northward. — Having passed eastward of Gaspar island, bring it to bear N.N.W., with that bearing on astern a S.S.E. course will lead into the fairway of Stolze channel, midway between West point and Hewett shoals, in this track the soundings will be 14, 16, 20, 22, 28, and 26 fathoms. When West point bears East distant 4 or 5 miles, Table island will be seen on the starboard bow, with North and South islands to the right of it. Continuing the S.S.E. course, the Six islands will soon be visible on the port bow, and, after passing Table island at about 2 miles on the starboard beam, West point will soon bear N. by E., or N. by E. $\frac{1}{4}$ E., when an opposite course may be steered to pass between Table island and the dangers extending N.N.W. from Kasenga.

When Table island bears N. by W. $\frac{3}{4}$ W., all danger will be cleared near the Six islands, and if kept upon that bearing it will lead mid-channel between White rock and Shoal-water island, having passed which, the most convenient course may be shaped to the southward, giving a good berth to the shoals extending from Branding breakers to Larabe shoal, on the western side of the channel, and to Anvang bank and Carnbee rocks on the eastern side.

Entering Stolze channel to the eastward of Akbar shoal, between it and the north-west coast of Billiton, steer to the south-west,—giving the Billiton coast a berth of 4 or 5 miles—and as soon as North island can be made out, bring it S.S.W., and it will lead well to the westward of the dangers near Rotterdam island. When Table island bears a little east of South, a S.S.E. course may be steered until West point bears N. by E., or N. by E. $\frac{1}{4}$ E., which leads midway between Table island and the reefs off Kasenga ; when proceed as before.

Working through from the Northward.—When standing to the eastward, the north-west coast of Billiton should not be approached nearer than 5 or 6 miles, or the summit of the north range of hills, on Mendanao, brought westward of S.S.W. (page 280). Rotterdam island, bearing S.W., will lead clear of the reefs extending from the north side of Batoe Dinding, and the islet off the north-east point of the latter island, bearing East, will clear the dangers northward of Rotterdam. West point bearing South will clear the rocks, &c., which lie westward of Rotterdam, and bearing S.S.E. will clear the reef surrounding Hoog island.

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West point and Pulo Ayam should not be approached much under a mile, as a reef extends about a third of a mile outside them; after passing Pulo Ayam, the hill near the extremity of West point, if not brought north of N. ½ E., will lead outside the dangers between Mendanao and the Six islands. Kasenga bearing North, leads westward of Ross island; and Ross island N.N.W. ¼ W., or Gunong Bolo, on Pulo Selio, bearing S.E. by E., leads clear of the dangerous elbow of foul ground to the westward of Gull rock, and also clear of Koerier bank.

To avoid the 1½ feet patch at 2 miles N.W. from White rock, do not bring White rock south of E.S.E. after the north point of Pulo Selio bears E. by N. ½ N. White rock should be passed about a mile off, and afterwards not brought west of N. by W. ½ W., to avoid the edge of the bank about a mile S.S.E. from it. Gunong Bolo N. by E., leads westward of the Three-feet shoal; and the Haycocks N. by E. ½ E., or Blantoe hill N.N.E. ¼ E., leads westward of Cooper shoal and Anvang bank. To avoid Carnbee rocks, Blantoe hill must not be brought to the north of N. by E.

Standing to the westward towards Hewitt shoal, take care not to shut in the east point of South island behind the east point of North island; these points just open lead a mile eastward of the shoal. North island should not be approached on the east side nearer than 1½ miles, or Table island brought to the east of S.S.E. to avoid the dangers off it; and Kasenga bearing S.E. ½ E. will clear the reef off the east side of Table island. Table island should not be brought to the east of North until Saddle island bears W. ½ S., when a vessel will be southward of the dangers extending from Table island and South island; after which she may stand to the westward until the summit of South island bears N.N.E.

Hancock island bearing South, leads eastward of Bliss shoal, but Hancock and Shoal-water islands must on no account be approached nearer than 2½ miles, or to a less depth than 10 fathoms, which will be not far from the shoals, the lead giving very little warning in this locality. When to the southward of Shoal-water island shoals, Shoal-water island kept to the west of North, will clear the dangers extending from Branding breakers to Larabe shoal; the lead, also, will give sufficient warning, as the 10-fathoms line, on the edge of the bank, is 4 or 5 miles to the eastward of them.

NORTH-EAST COAST OF BANKA.

The mariner cannot be too cautious in approaching this exceedingly dangerous coast. It was surveyed by the late Lieutenant James Robinson

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in 1819, but the many dangers which front it are very imperfectly known, their positions depending for the most part upon the accounts of commanders of vessels who have found themselves too close in and entangled amongst them when running for Gaspar strait in thick weather.

HILLS and MOUNTAINS.—There are many hills along this coast near the sea, and some mountains inland; one of these, called the Saddles, 912 feet high, rises about 9 miles westward of Brekat point. At 9 miles westward of the Saddles is the conspicuous range of the Padang mountains, the highest summit of which is elevated 2,630 feet. About 21 miles westward of Tanjong Riah, is the double-peaked mountain Gunong Marass, 2,300 feet high, the largest mountain on the northern part of Banka.

The Coast from Brekat point trends W. by N. 21 miles to Lanka point, 2 miles westward of which is Koba village. This part of the shore may be approached as near as 4 miles in 7 to 8 fathoms water, as the shoals are not more than 2 or three miles from the land. Near the roadstead of Koba the depth decreases, and the anchorage is in $4\frac{1}{2}$ fathoms, with the mouth of a river S. $\frac{1}{2}$ W., Pulo Boear N. $\frac{3}{4}$ E., and Pulo Tetawa N.N.W. $\frac{1}{2}$ W. About 16 miles N.W. by W. from Lanka point is the large village of Koeraw, whence the coast trends N. by W. and N.N.W. to Marawang river, near which stands the village of Punkal Pinang. The mouth of the river is in 2° $4\frac{1}{2}'$ S.

KINSBERGEN REEF, with $5\frac{1}{2}$ feet water on it, lies nearly 4 miles North of Lanka point; from the reef, the flagstaff at Koba village bears S.W. $\frac{1}{4}$ W.; Pulo Boear North; and Perlang shoal E. by S. $\frac{1}{2}$ S., distant about $3\frac{1}{2}$ miles.

TETAWA BANK.—Fronting the coast between the village of Koeraw and Marawang river is an extensive chain of banks 15 or 16 miles long, and from one to 5 miles broad, known under the general appellation of Tetawa bank, upon which are several scattered islands. Many of the patches become dry, and but few have as much as 4 fathoms water over them.

Pulo Boear or Colowy, the outermost of the above islands, is very small, and lies near the south-east end of the bank in lat. 2° $14\frac{1}{2}'$ S., long 106° 31′ E. The edge of the bank is about half a mile eastward of this island, and about a mile to the southward of it.

Pulo Passir is a small sandy islet lying E.N.E., distant $4\frac{1}{4}$ miles from Pulo Boear.

Pulo Tetawa is about the same size as Boear, from which it bears East-northerly, distant 8 miles. It lies near the south-west extreme of

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the bank, the edge of which is half a mile to the southward and 2 miles to the westward of it.

Pulo Panjang, the largest of these islands, lies on the northern part of the bank, N. by E. ½ E., distant 7 miles from Tanjong Poyang, and E.S.E. 8 miles from the entrance of Marawang river.

The bank extends about three-quarters of a mile to the northward of this island, but other shoals, known as Sullivan patches, &c., extend to a distance of 5 miles between the bearings of N.E. and N.W., and for the distance of 3¼ miles in a W. by N. direction towards Tanjong Bunga, the nearest point of Banka.

Pulo Bojur lies about a mile eastward of Pulo Panjang. A reef projects from it in a crescent form, one horn extending about a mile north-east from the island, and the other horn about the same distance to the south-east.

A Rock awash is said to lie N. by E. 2 miles from Pulo Bojur.

George Rock.—Between Tetawa bank and the Banka shore is a passage with 2½ to 3 fathoms water in it, much used by small vessels in communicating between Koba and Marawang river; but in the middle of it lies George rock, from which Pulo Panjang bears North, Tetawa S.E. by E., and Tanjong Poyang S.W.

HORSE ROCK, MENTAWA REEF, and GOAT SHOAL are to the eastward of Tetawa bank. Horse rock, lying E. ½ S. 3½ miles from Pulo Boear, is a small patch, nearly dry at low water.

Mentawa reef, lying about a mile N. by W. from Horse rock, and E.N.E. 3 miles from Pulo Boear, is more extensive than Horse rock, both together occupying a space of about 3 miles; between them are 7 or 8 fathoms water.

Goat shoal lies 3 miles northward of Mentawa reef, and N.E. by N. 6 miles from Pulo Boear; 9 feet water is reported upon this shoal.

The Channel between Pulo Boear and the above shoals is shown on the charts to be about 2½ miles wide, with depths of 7 or 8 fathoms in it; but from the following account, taken from the Java Guide, it would appear that either other dangers must lie in the channel at the distance of a mile from Pulo Boear, or that Mentawa reef or Horse rock must extend much farther to the westward than was supposed, thus rendering the channel exceedingly narrow:—

"In May 1847 H.N.M. schooner *Aruba*, when standing between Boear island, and Horse rock and Mentawa reefs, passed a few cables to the westward of a reef, having Pulo Boear bearing W. ½ S. a mile distant. With Pulo Boear S.S.W. ¾ W. and Pulo Passir W. ½ N. she again fell in with reefs, but avoided them by keeping N.W. till Pulo Boear bore S. ½ E. and Pulo Passir W. by S. ½ S. The channel had 8 to 8½ fathoms; hence

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it is very probable that Mentawa is a more extensive reef than had been supposed." The Dutch shoal, lying 11 or 12 miles eastward of the above shoals, is described at page 298.

FATHOOL BARIE SHOAL.—The *Fathool Barie* struck on a rocky bank, with 2½ fathoms on it, in lat. 2° 5′ S., long, 106° 28′ E. with mount Pouak bearing N.W. ¼ W., Pulo Panjang W.S.W., Pulo Tetawa S.S.W., and Pulo Boear S. by E. ½ E.

The *General Elliott* found herself entangled among some reefs, with Pulo Panjang bearing S. by W. ¼ W. 5 miles, and a point of Banka (the eastern foot of the hill south of Koba), S.S.E. ½ E., the vessel then being in 8 fathoms. More to the northward, this vessel ran over some 7-fathoms banks with probably shoaler spots ; they lie in 1° 55′ S., 12 miles from Banka.

SULLIVAN REEFS, HILLSBOROUGH ROCK.—The *Sullivan*, on returning from China, December 1784, and trying to get sight of Banka during thick weather, ran as far in as 13½ fathoms, rocky bottom, and there saw three patches of breakers, one bearing S.S.W. 3 miles; another S.E. by S. the same distance; and the third E.N.E. 4 miles. Between the breakers a few rocks were visible above water. The weather being thick prevented Banka being seen ; but it was supposed the rocks were in 2° 3′ S. and North from Pulo Panjang.

The *Hillsborough*, in March 1788, returning from China and steering for Gaspar strait, struck on a rock having 3 feet water on its shoalest part, and while the bow was aground there were 13 fathoms under the stern. When the vessel floated, she anchored in 14 fathoms to the westward of the rock, with the extremes of Banka N.N.W. and S.E., five small islands about South, and in about 2° 3′ S.; the reef extended S.E. and N.E. from the vessel.

Horsburgh remarks that :—"The five islands bearing South from the ship, when at anchor near the reef, must have either been Pulo Panjang and the islet near it, or Pulo Colowy (Boear) and the islands contiguous, about 9 miles south-east of Panjang; it seems, therefore, very probable that the reef on which this ship struck was one of those seen in the *Sullivan*." The depth of water is also in favour of this probability ; but it is manifest that the positions of these dangers are altogether uncertain. The soundings near the Sullivan patches, where they are placed upon the chart, are but 7 and 8 fathoms.

DIEDERIKA, ROBERTS, and other SHOALS.—The Diederika shoal with 3 feet water over it, and 13 to 14 fathoms around it, is said to lie about 11 miles north-eastward of Pulo Panjang and 5 miles to the southward of Palmer reef, in lat. 1° 59′ S., long. 106° 28′ E.

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Roberts shoal lies about 4½ miles to the westward of Diederika shoal It has 12 feet water over it, and 10 fathoms near it.

Between these shoals and Pulo Panjang, and thence to the coast, there are numerous rocky shoals, with from 7 to 5 fathoms water between them but their exact positions are unknown.

PALMER REEF, is probably part of the northern bank over which the *General Elliott* passed ; the following description of it is given by Captain George Palmer of the *Boddam* :—

"August 27, 1811, at 12h. 45m. p.m., the vessel suddenly struck, having five minutes previously had 14 fathoms, and then passed rapidly over the reef into 10 fathoms. The next casts were 11, 10, 11 fathoms successively, and we then anchored, the breeze blowing fresh from S.E. When at anchor, Tanjong Riah bore W.N.W. 15 miles; the southernmost of the low islands near Pulo Panjang S.S.W. ¾ W. 12 or 14 miles; and, according to the log, 2½ miles S.S.W. from the spot where the vessel struck."

Caution.—The Java Guide observes that "all these dangers may be avoided by keeping in not less than 16 fathoms, where there is generally a muddy bottom, whereas in 15 fathoms it generally becomes rocky."

TANJONG RIAH, in lat. 1° 52′ S., long. 106° 14′ E., is distinguished by two hills, and from its south-east and south sides an extensive reef projects, which makes it necessary to keep 6 or 8 miles in the offing.

Black rock reef, lying 3 miles to the south and south-east of Tanjong Riah, is very extensive, with only 3 feet water over it in some places.

Near it, and also the reef fronting Tanjong Riah, there are 9 and 10 fathoms water.

Tate rocks, 5 miles S.S.E. from Tanjong Riah, are 14 feet above water.

Other shoals lie S.E. by S. 8 miles from Tanjong Riah ; and E.N.E., 4 miles from it, is a patch of 4 fathoms water.

To avoid these dangers keep Panjang island to the westward of South, and go no nearer the shore of Banka than 7 fathoms water when approaching Marawang road.

MARAWANG ROAD.—Marawang or Pankal Pinang, the chief town of one of the tin districts, is situated a few miles up Songi Marawang, the entrance of which lies about W.N.W. 7 miles distant from Pulo Panjang, and can only be approached by vessels with the greatest caution, on account of surrounding dangers.

H.N.M. schooner *Windhond* anchored in Marawang road in 3¼ fathoms, with the elbow near Tanjong Riah N. by W., Gunong Marass N.W. by W. ½ W., the north point of the river West, the Lappa hills

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S.W. ¼ S., Pulo Tetawa in line with Koba village S.E. by S., the high trees of Pulo Panjang S.E. ¼ S., and Pulo Bojur S.E. ¾ E. By not bringing the south point of the river to the northward of West a vessel will avoid the rocks which lie a mile S.E. from the anchorage.

Water.—Good water can be obtained at Pankal Pinang.

Directions.—Vessels bound from Macclesfield channel to the ports of Pankal Pinang or Roessah, pass between Tree island and Brekat point, and to the westward of Columbian and Dutch shoals, in 12 to 14 fathoms water, but in not a greater depth—as Columbian shoal lies in the stream of 17 fathoms—till Pulo Boear bears S.W. by S., and Pulo Panjang West; a depth of 16 fathoms must then be kept till Tanjong Riah bears West. Thence steer direct for that point till in 7 or 8 fathoms, having Pulo Panjang S. ½ W., on which bearing the island may be approached till the north-west peak of Lappa hills bears S.W. ½ W., which course leads direct to the anchorage.*

Horsburgh gives the following directions:—When bound to the road of Marawang, approach Tanjong Riah till in 7 fathoms, and the Blusor rock which will be visible from the deck 5 miles (probably the Tate rocks), till in 5 or 7 fathoms, and at 1½ miles distant. When southward of the rock keep off shore, but not into a greater depth than 10 or 11 fathoms, and if clear weather, Panjang and Bojur will be visible. Bring the extremes of these islands South, and keep them on that bearing till the north-western peak of the Lappa hills bears S.W. ½ W.; then steer direct for it, till Pulo Tetawa is open to the westward of Pulo Panjang, and till the western point of the latter island bears S.E. by S. The anchorage is in 4½ fathoms, with the mouth of the river W. ½ N., and a range of rocks which are partly dry S.E. by S. 4 miles distant.

A brig trading to Marawang for tin got entangled in the numerous shoals near that place, although she had a Malay pilot on board, and grounded on one of them, which obliged her to lie near Pulo Panjang, where she received her cargo from Marawang.

LIAT BAY, formed between Tanjong Lyang to the north-west and Tanjong Riah to the south-east, affords good anchorage with shelter from southerly and westerly winds in 5 fathoms, white stiff clay, about three-quarters of a mile off shore; but in the eastern monsoon the swell is very heavy.

The anchorage is in 4¼ fathoms, with the mouth of the river W. by N.-northerly, Tanjang Lyang N.N.W. ½ W., and Tanjang Riah S.E. by S. From the river, nearly to the south-east point of the bay, a fine sandy beach lines the shore, with gradually decreasing soundings. The town of

* Seaman's Guide round Java, page 298.

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Liat, usually known as Songi Liat, stands a short distance up the river, and is a chief town of one of the tin districts.

Water—Wood.—Fresh water here is very difficult to be procured, on account of the rocks in the mouth of the river, which can only be entered at high water, when these rocks are under water; but then there is a heavy surf on them, that places the boats in danger of being upset, which happened in July 1834 to a boat of H.N.M. brig *Meermin*. Wood and spars of any dimensions may easily be obtained on the south side of the bay, within half a mile of the shore.

Dangers.—The three following dangers are very much in the way of vessels frequenting this bay.

Liat reef, lying E. by S. ½ S. 3½ miles from Tanjong Lyang, has but 6 feet water over it, and from its north extreme the north point of Songi Liat is in line with the southern peak of Gunong Marass W. ¾ S., and Tanjong Riah point S. ¾ E.; close to the reef there are 6 or 7 fathoms water.

A patch said to have 4 fathoms water over it lies S.E. by E. about 2½ miles from Tanjong Lyang. A rock is also shown on this patch upon the chart, and Horsburgh mentions that care must be taken to avoid a rock with only 4 feet water over it.

Circe reef, discovered by H.N.M. schooner *Circe*, has 2½ fathoms over it, and 6 or 7 fathoms around it. From the reef the hill on Tanjong Lyang bears W. by N. ½ N., Pulo Simbang N.W. ¼ W., and the hill on Tanjong Riah S.W. ¾ S.

Tides.—It is high water, full and change in Liat bay at 5 p.m., springs rise 9 feet.

Directions.—Approaching Liat bay from the northward, 5½ or 6 fathoms will be found at 2 miles from Tanjong Lyang, and in a southerly direction towards the anchorage.

Coming from the eastward, and being in 10 or 11 fathoms, bring Riah point S.W. by W., and keep towards it till Tanjong Lyang is N.W. by W. ½ W., then steer W.N.W. and W. by N. towards the anchorage.

The Coast from Tanjong Lyang trends N.N.W. to Tanjong Tuen, in lat. 1° 35½′ S., which has a hill on it, and there are several hills farther inland. Close to the point is Pongoh islet, which can be approached to half a mile. The coast to the southward of it forms a very shallow bay, in which, at about 6 miles S.S.E. from Tanjong Tuen, is a small island named Pulo Simbang.

This part of the coast may be approached to 13 fathoms, and even less.

The coast from Tanjong Tuen trends about N.W. by W. for 10½ miles to Tanjong Crassok or Moncudu, the northernmost point of Banka, where it turns sharply to the westward. Nearly a mile off shore, distant

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2½ miles W. by N. from Tanjong Crassok, is Pulo Moncudu (*see* page 247).

DANGERS NORTHWARD AND NORTH-WESTWARD OF GASPAR STRAIT.*

CANNING ROCK, in lat. 2° 23′ S., long 107° 15′ E., on which, in April 1825, the East India Company's ship of that name struck on returning from China, lies directly in the route of vessels proceeding towards Gaspar strait and therefore is very dangerous, there being only 3 fathoms on it, with 17 to 20 fathoms close-to. From the spot where this ship grounded, Gaspar island bore W. by S. 10 miles; Brekat point S.W. by W. ¾ W.; the hummock near that point S.W. by W. ½ W.; the summit of Pulo Mendanao S.S.E.; and Hoog island S. by E. ½ E.

This danger consists of many coral heads, extending N.E. and S.W. about 100 yards, and East and West 50 yards. On the spot where the *Canning* grounded the soundings were 9 fathoms under the port fore-chains, 5 under the starboard main chains, 3 under the port main chains, and 4 fathoms at the stern; and 20 yards astern there were 3 fathoms, coral bottom. From the main top, at a quarter of a mile distant, nothing of it was visible, and as it is greatly in the way of vessels coming from the northward towards the strait, Gaspar island ought to be made bearing well to the southward, and should be approached within 5 miles, or nearer, before it is brought to bear W.S.W., in order to give a wide berth to this danger.

SOWERBY SHOAL.—The following account of a shoal seen by Captain J. Sowerby, of the ship *Montmorency*, is given at page 29 of the Mercantile Magazine for 1862.—"April 1st, 1861, 9.30 a.m.—Light baffling airs from S.E. and clear weather, discovered a shoal with apparently not more than 2 fathoms water over it; by good cross bearings the middle peak of Mount Tebalo (north end of Billiton island) bore S. 32° E., and peak of Gaspar island S. 66° W.; which places it in lat. 2° 13′ S. long. 107° 35′ 10″ E.; also the mean of three good chronometers, gave long. 107° 36′ E. This shoal is about 3 miles long N.W. and S.E., and a third of a mile broad, and is very dangerous as it lies right in the track of vessels beating out of the Stolze channel to the northward in the northerly monsoon. The water being smooth at the time, the sea was not observed to ruffle in the least over it; but no doubt when there is any swell at all the sea must break on it. I watched from the deck, and

* *See* Admiralty charts:—Banka and Gaspar straits, No. 2,149; scale, $m = 0{\cdot}14$ of an inch, and Gaspar strait, No. 2137; scale, $m = 0{\cdot}4$ of an inch.

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afterwards from aloft, and have not the slightest hesitation in saying that it could be easily discerned 5 miles off, with the sun as it was then, the shoal being between us and that luminary. I am quite positive as to the accuracy of my observations."

The above bearings of Mount Tebalo and Gaspar peak, places the danger on the Admiralty Chart in lat. 2° 14′ S., long. 107° 26′ E.

Sowerby shoal was unsuccessfully searched for by H.N.M. surveying vessel *Hydrograaf*, 1876.

PARE JOIE ROCK, on which the ship of that name struck, is a sunken rock lying with Gaspar island peak bearing S. ½ E. distant 5 miles. This rock was unsuccessfully searched for in the *Hydrograaf*, 1876.

WARREN HASTINGS REEF is supposed to extend about 3¼ miles N. by W. and S. by E., and to have but 2 to 9 feet water over it in some places. In 1788 the *Warren Hastings*, returning from China, grounded upon the south-east projecting point of this reef, having a short time previously had regular soundings from 20 to 22 fathoms. Under the stem there were only 2 feet water, and 4 fathoms amidships; the high land of Banka bore S.W. by W., the most distant visible land S.S.W. and S.W. by W. ½ W., the centre of Gaspar island S.E. by E. ¾ E., Tree island S. by E. ½ E., the latitude by the sun's meridian altitude being 2° 23′ S. On examining the shoal with the boat there were in some places 2 and 1½ fathoms. In 1845 the English vessel *Gondolier* was wrecked on this reef. The French vessel *Joseph* places it in lat. 2° 21′ S. and long. 106° 56′ 45″ E., with the centre of Gaspar island S.E. by E., Belvedere rock N.N.E., and the wreck of the Gondolier S.S.W.

COLUMBIAN SHOAL is marked doubtful on the chart, N. by W. ½ W., distant 14 miles from Brekat point, from the following report by Captain G. Wakem, of the ship *Columbian*, who stated that his vessel struck upon it in April 1845:*—"At dusk the north point of Leat island bore S.S.E. 12 miles. At 3.30 a.m., shortly after having sounded in 17 fathoms, the vessel touched on a reef, but without being brought up, although the reef had not more than 10 feet water upon it. Anchored immediately with Gaspar island E. by S. distant 16 miles, and Tree island S.E. by E. ¼ E. 12 miles. The next day the vessel was left in a sinking condition."

BELVEDERE SHOALS.—The south-western end of these shoals is a reef under water, and from it Gaspar peak bears S.S.E. ¼ E., distant 11 miles; thence they extend to the north-eastward 4½ miles.

* Nautical Magazine, 1846.

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Near their middle is a sand-bank awash; there are besides on them many coral patches with 6 to 10 feet water, and on their north-eastern extreme a black rock 10 feet high and 40 feet long. When there is a heavy swell the sea breaks on them, and by day they may easily be avoided by a good look-out, particularly as some of the patches are dry at low water. However a vessel from New York was wrecked on these shoals, and shortly afterwards a Chinese junk. It was probably their breakers which were observed from the *Hawk* in 1785, bearing N.E. 6 miles, and E. by N. 3 miles, Gaspar island S.S.E. ½ E., and part of Banka S.W.

REEF.—A reef, the existence of which is doubtful, is said to lie in lat. 2° 8′ S., long. 107° 0′ E., with Belvedere rock bearing S.S.E. distant 3¾ miles. This reef was unsuccessfully searched for in the *Hydrograaf*, 1876.

DUTCH SHOAL (Vansittart shoal of Horsburgh), lies in lat. 2° 10′ S., long. 106° 46¾′ E., with the peak of Gaspar island bearing about S.E. by E., distant 24 miles.

The *Vansittart*, Captain Lestock Wilson, struck on this shoal, and was with great difficulty run upon a sandy beach of Banka, to save the lives of the crew.

A SHOAL of 6 feet water is marked on the Dutch chart N.W., distant 11¾ miles from the Dutch shoal.

MAGDALEN REEF, discovered in November 1806 by the American vessel *Magdalen*, is very dangerous in thick weather for vessels bound to Gaspar strait from the northward, for when the reef was first seen the vessel was only half a cable from it. The boat found it to consist of two coral rocks, about 160 yards in length and 30 yards in breadth, with deep water between them, 11 feet upon them, and at half a cable from the shoal 19 to 21 fathoms.

Captain Ross, in 1818, determined the position of this reef to be lat. 1° 59′ S. long. 107° 1′ E., the peak of Gaspar island bearing from it S. ¾ E., distant nearly 26 miles.

LANRICK, or Newland Shoal, with only 9 feet water over it, lies 8 or 9 miles northward of the Magdalen shoal. The clipper brig *Lanrick*, Captain T. B. White, struck upon this shoal in 1852; and the ship *Asia*, Captain Newland, in October 1853. Both vessels took great pains to determine its exact position, and the mean of their observations places the danger in lat. 1° 52′ S., long. 107° 1′ 30″ E. Captain White says:*—"It is of very small extent, and exceedingly dangerous, the soundings giving no warning, for the next morning at anchor, and

* Nautical Magazine, 1853.

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not more than 1¼ miles from its position, the boats after a two hours' search could not find it, nor did they see any discoloured water, or get less than 17 fathoms." Captain Newland remarks also that no discoloured water could be seen at the distance of a mile from the shoal.*

ATWICK ROCK was discovered by an English vessel of that name, in August 1831. Its position was given in lat. 1° 48′ S., long. 107° 30′ E., or N.N.E. ¾ E. 44½ miles from Gaspar island.

PRATT ROCK, in lat. 1° 32′ S., long. 107° 26′ E., is described as dangerous, extending north and south half a mile, and apparently level with the water's edge, having a rock (or dead tree, many of which were floating about) on its northern end.

CATHERINE REEF was discovered in September 1840, by ship *Catherine*,† which anchored at 1 p.m. in lat. 1° 31′ S., long. 107° 1′ E., in 18 fathoms water. They observed breakers in a N.N.E. ½ E. direction, at half a mile distant, on a reef which seemed to extend about 3 miles E. by S. Though the vessel remained at anchor till 5 p.m. it does not appear that any further observations were made. Its position is marked doubtful on the charts.

ACTÆON ROCK.—H.M.S. *Actæon*, when proceeding to the northward through Gaspar strait, passed Gaspar island at sunset, 7th July 1857, and at midnight, running 8 knots, struck on an unknown coral reef, which, when examined the next day, was found to be between 2 and 3 cables in extent, steep-to, with patches of 7 feet on it and 17 fathoms all around. Its position is lat. 1° 39′ 48″ S., long. 106° 37′ 58″ E., or East about 8 miles from Severn shoal. The land was observed from the mast-head, whereas from Severn shoal the hills on Banka are said to have the appearance of separate islands.

SEVERN SHOAL, discovered in May 1802 by the American ship *Severn*, lies exactly in the track of vessels from Toty island towards Gaspar strait. It is placed on the chart in lat. 1° 39′ S., long 106° 30′ E., but from the following account its exact position is very doubtful.

At sunset Gaspar peak bore S.E. ¾ S., 14 miles distant. From this situation the Severn steered N.W. ½ N. 35 miles, and at daybreak struck on a coral reef, but got off after being lightened of 30 tons of ballast. The reef seemed to extend 2 or 3 miles N.N.E. and S.S.W., but where the vessel grounded there were 10 feet water. The hills on Banka had the appearance of separate islands, above which the Marass mountain was visible, and the nearest land was computed to be about 20 miles dis-

* Nautical Magazine, 1854.

† Nautical Magazine, 1841.

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tant. The *Columbian*, of New York, was wrecked on this shoal in March 1824, when returning from China. The crew reached the harbour of Mintok in the longboat, after having suffered much from deprivation and fatigue.

IVON SHOAL with 2¾ fathoms of water over it appears on the charts at 7 miles west of the Severn shoal in lat. 1° 39′ S., long. 106° 21′ E. Like the Severn and Actæon shoals, it is much in the way of vessels passing between Gaspar strait and Toty island.

SCHEWENINGEN SHOAL on which the ship of that name struck, in lat. 1° 19′ 12″ S. and long. 106° 39′ 48″ E., lies about 14 leagues E. by N. from Crassock point, the north extremity of Banka island. Immediately after the ship touched, a sounding of 4 fathoms was obtained, and a second sounding showed a depth of 15 fathoms.

CELESTIAL REEFS.—From the American ship *Celestial** a bed of rocks was seen under water in lat. 1° 16′ S., long. 106° 50′ E.; sounded in 3 fathoms, but there appeared to be less water on the rocks; the next cast of the lead was 17 fathoms.

VEGA SHOAL was discovered in September 1826, by Captain Jose Antonio de Vega, of the Spanish frigate *Vellos*, which struck on it, but by carrying out an anchor she was hove off. It was described as being not more than a ship's length in extent, with 18 to 21 feet water over it, and 9, 11, 17, and 22 fathoms around it. Captain de Vega, placed it in lat. 1° 9′ S., long. 106° 33′ E., by chronometers regulated the day previously at Gaspar island.

The barque *Marquis of Hastings*, Captain Ingram, grounded upon this bank, in May 1830. Captain Ingram placed it in 1° 6′ S., and 106° 31½′ E. by chronometers. It was considered to be about three ships' lengths in extent, N.W. and S.E., a ship's length wide, and it had 9 feet water on its shoalest part. At a ship's length from it the soundings were 20 fathoms, and close to it 12, 10, and 5 fathoms. Horsburgh says that this ship struck on this shoal in April 1832, and that Mr. Harris made it at the same time in 1° 4′ S., and 106° 37′ E.

H.M.S. *Rifleman* in December 1863 was employed with her tender for three days in searching for the Vega shoal, but without success. A small rocky patch with 7 fathoms water over it, and 13, 15, and 17 fathoms all round, was discovered in lat. 1° 5′ 30″ S., long 106° 35¾′ E. Bad weather compelled the *Rifleman* to relinquish the search.

Current.—A southerly current, varying from 1 to 1¾ knots an hour, was experienced the whole time the *Rifleman* remained in this vicinity.

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* Nautical Magazine, 1855.

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HAWKINS, or Wild Pigeon Shoal, we have no account of, and its position is also very doubtful. On the chart three positions are given; the first in lat. 1° 8′ S., long. 106° 43′ E.; the second in lat. 1° 9′, long. 106° 41½′, with 2 fathoms marked against it; and the third in lat. 1° 11′, and the same longitude as the second position.

DEVA REEF.—The ship *Deva*,* at 5h. 30m. p.m. 23rd May 1859, struck on a coral reef, in about lat. 1° 8′ S., long. 106° 51′ E. The reef appeared to be about 60 yards in extent, N.E. and S.W., about 30 yards broad, with 3¼ fathoms on it, and 15 and 17 fathoms close to. At daylight the next morning two reefs were in sight from the masthead; the one the vessel grounded on, and the other, which was much the largest, considerably to the westward.

Caution.—Probably the Deva and the Celestial are the same reefs,—but until examined this neighbourhood must be navigated with great caution, and the whole group of the Vega, Hawkins, Celestial, and Deva shoals should be given a berth of 9 or 10 miles.

Soundings.—The dangers northward and north-westward of Gaspar island are, for the most part, steep-to, and have a depth of 17 to 20 fathoms around and between them; in the vicinity of those under the shore of Banka, the depth decreases to 12 or 14 fathoms.

Directions from Gaspar Strait to the Northward.—Most vessels bound to the northward from Gaspar strait, prefer passing eastward of Gaspar island, which is the safest route; but some vessels, especially when bound to Singapore by Rio strait, prefer the less safe but more direct route through the shoals westward of that island.

To proceed Eastward of Gaspar Island with a fair wind a vessel should, as before directed in pages 264, 285, 286, steer about N. by E. ½ E. if she passed through Macclesfield channel, or about N. by W. or N.N.W. if she passed through either Stolze or Clements channels, to pass 2 or 3 miles eastward of Gaspar island, and 5 or 6 westward of Canning rock. Having passed Gaspar, steer to the northward until it bears S. ¾ W., upon which bearing it should be kept as long as it can be seen. A N. ¾ E. course from Gaspar will lead midway between Catherine reef and Pratt rock, and if Gaspar be brought on the opposite bearing soon after it is passed, it will afford a good opportunity to judge of the effect of the current, by noting the course that must be steered to preserve the proper bearing of the island; and will also assist in forming a judgment as to the proper course to steer to pass midway between

* From the report of J. Pollock, Master of the ship *Deva*, to Underwriters at Lloyds 21st January 1860.

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Catherine reef and Pratt rock, after Gaspar island has sunk below the horizon, and will no longer serve as a guide.

If the wind should prevent a direct course from being steered, Gaspar island should not be brought westward of N.N.W., until the vessel is northward of Akbar shoal; and, after Gaspar is passed, it must be kept westward of S. ½ W. in order to avoid Pare Joie rock, Belvedere shoals, and the Magdalen reef.

To proceed Westward of Gaspar Island between Glassa rock and Tree island—from a position midway between them, steer to the northward until the peak of Gaspar island bears S.E.; when a N.W. course will lead between Warren Hastings reef and Belvedere shoals; but great caution must be observed, as there is a deficiency of soundings on the chart in the localities of these dangers. When Brekat point bears S. by W., or the Saddles S.W. by S., a vessel will be westward of Warren Hastings reef and Belvedere shoals, and a N. by W. or N.N.W. course, according to the set of the tide, will lead westward of Magdalen reef and Newland shoal, and eastward of Actæon rock. When nearing Actæon rock, the soundings should not be shoaled under 20 fathoms; after passing it, a course may be shaped for Toty island.

If circumstances prevent a straight course from being steered, Gaspar island, when 3 or 4 miles distant, kept between S.E. and S.E. by E. ¼ E., will keep the vessel clear of the Warren Hastings reef.

Brekat point bearing S. by W., or the Saddles S.W. by S., leads westward of the Warren Hastings reef and Belvedere shoals, and Gaspar island S.E., leads 3 miles eastward of Dutch shoal; but when westward of Warren Hastings reef and Belvedere shoals, it will be wise to edge away to the northward—always carefully guarding against tide and currents—taking care not to bring Gaspar peak to the south of S. by E. ½ E., to avoid Magdalen reef.

If proceeding between Brekat Point and Tree Island, the point may be passed at the distance of 3 or 2 miles, and the island at a mile; then proceed to the N.N.W., taking care not to bring Tree island to the south of S.E. by S., to avoid the south-west end of Warren Hastings reef. Brekat point bearing S. by W. ¼ W., leads clear of the north-west extreme of that reef; and bearing S. ½ E., leads eastward of the reported positions of the Columbian and Dutch shoals. When Brekat point bears S. ½ W., a northerly course may be steered, proceeding as before to pass eastward of Actæon rock.

Horsburgh states that Captain R. Scott in the *Warren Hastings*, after passing Brekat point, coasted along to the northward, keeping generally in 11 or 12 fathoms water, without any appearance of danger, but a good mast-head look-out was kept. The passage, however, near the Banka coast

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is so beset with dangers, the exact positions of which are unknown, and others may also exist of which we at present know nothing, that we would strongly advise vessels to give this exceedingly dangerous coast a wide berth, especially as nothing is to be gained by approaching it. At page 294 directions are given to proceed along this coast to Tanjong Riah.

Directions to approach Gaspar Strait from the Northward.—In consequence of the northern entrance of Gaspar strait being so near the Equator, the winds, even in the strength of the monsoons, are very uncertain, producing a corresponding uncertainty in the direction and force of the tides and currents. A vessel approaching the strait from the northward will, therefore, have to be principally guided by the winds and currents which she may herself fall in with, rather than by relying upon experiencing those which are here mentioned as most likely to be met with at certain seasons.

In the early part of the monsoon, that is from the middle of November to the middle or end of December, northerly and north-westerly winds are said to prevail, but Horsburgh mentions an instance of vessels meeting with strong West and W.S.W. winds in December. As the monsoon gathers strength and becomes more regular, the wind draws to the eastward of North, and late in the monsoon, easterly and south-easterly winds are often met with between Banka and Billiton.

Horsburgh remarks that vessels intending to pass through Gaspar strait will, probably, find the southerly current usually found running in the south-west part of the China sea during the northern monsoon set to the south-eastward as the distance is increased to the southward of the line, and it also appears from other sources, that it is most necessary to be prepared to meet a south-easterly current, about the entrance of this strait, particularly if the wind be westward of North; but a vessel can be only guided by a correct knowledge of her position, and by the winds and currents she may herself experience, in forming a judgment as to the best means of avoiding the many outlying dangers at the northern entrance of Gaspar strait.

The following Directions are chiefly from the Java Guide, page 316,—but in thick weather it will always be an anxious time for the navigator whilst approaching Gaspar strait, for unless good sights can be obtained he can never be certain of his exact position, and we would again strongly advise him under such circumstances to steer for Banka strait, where the soundings on the edge of the bank extending from the Sumatra coast will enable him to proceed with safety, although he may be quite unable to distinguish the land.

Vessels returning from Singapore or China early in the northern monsoon, and intending to go through Gaspar strait, prefer the Macclesfield

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channel, passing between Toty and Docan islands; but it is better to go 12 or 14 miles to the eastward of the latter, and even more, when the wind is easterly; but early in the monsoon the wind is generally North or N.W.

Having passed Toty island, steer about S.E. by E., so as to get on the meridian of Gaspar island before reaching the parallel of 1° 50′ S. Gaspar is visible in clear weather at a distance of 30 miles. Directly it is seen steer towards it on a S. by W. bearing, and passing eastward of it steer to the south-westward for the entrance of the Macclesfield channel.

The above directions apply only to vessels returning from China early in the monsoon. In general, and especially returning late in the monsoon from China, when south-east and easterly winds are often met with between Banka and Billiton, it will be better to go 10 or 12 miles to the westward of St. Barbe island, and endeavour as soon as possible to get on the meridian of Gaspar island, but not to the westward of it when near the parallel of Catherine reef, which should never be passed at night. When Gaspar is seen, bring it on a S. by W. bearing and proceed as before.

Returning from China late in the monsoon, S.S.W. winds are often met in the southern part of the China sea, and oblige vessels to pass between the islands near the west coast of Borneo. If this should happen in May or June, it would be very tedious to get to the southward; in such case, steer for the north-western end of Billiton, and pass through Stolze channel.

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CHAPTER VII.

CARIMATA STRAIT.

VARIATION 1° 15′ EAST in 1878.

GENERAL DESCRIPTION.—Carimata strait, the easternmost of the channels leading from the Java sea into the China sea, is bounded on the eastern side by Carimata, Soruetou, and the other islands adjacent to the southern part of the west coast of Borneo; and on the western side by the east coast of Billiton, with the adjoining islands and dangers. It is often used by vessels from Malacca strait proceeding to China by the eastern passages, but although much broader than either Banka or Gaspar straits, it is not nearly so much frequented as either of those channels by vessels proceeding to and from China by way of Sunda strait. It is, however, not unfrequently used by vessels returning from China, which, from the effects of winds or currents, find it difficult to get to the westward.*

This strait has not been thoroughly surveyed. Captains Ross and Maughan, of the Indian Navy, determined the positions of many of the dangers on each side of it, but much of the information which we possess has been derived from accounts furnished by vessels that have passed through it. In using it, therefore, a vessel must keep a good look-out, and be as far as possible prepared to meet with unknown dangers.

Besides the Main channel, limited to the north-eastward by the islands of Soruetou and Carimata, and to the south-westward by the Montaran islands and Billiton, there are several other channels between the numerous islands lying eastward and north-eastward of Carimata, between it and the Borneo coast, through which vessels have occasionally passed. One of these, known as the Inner channel, and situated between the islands of Panambungan and Mayang, is much frequented by vessels working through the strait against the monsoon, for a regular tide will be found near the Borneo coast, which enables them to work through the Inner channel when it is quite impossible to work through the Main channel against a strong monsoon, and a continuous rapid current setting to leeward.

* *See* Admiralty chart:—Carimata strait, No. 2,160; scale, *m* = 0·14 of an inch.

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CURRENTS* and TIDES.—The currents in Carimata strait appear to set mostly to the southward in the north-west moonsoon, for many vessels have found it almost impracticable to work to the northward in that season. Captain Ross, in the *Discovery*, found a constant southerly current in this strait; on February 15th he was off Pulo Mankap, and from hence continued working along the west coast of Borneo, and afterwards on the south and west sides of Carimata and its adjacent islands until March 16th, when he got round the western end of Soruetou. In the south-east monsoon it does not appear to be so difficult to get to the southward, for there are regular tides along the west coast of Borneo, and also off the east coast of Billiton in this season, which seem to extend in some degree across Carimata strait, the flood apparently setting 12 hour to the north-westward, and the ebb about 12 hours in the opposite direction; the rise of tide, as experienced by Captain Ross, was about 9 or 10 feet, at full and change of the moon.

Captain J. Carolan of the barque *Amur*, in August 1875, whilst working to the southward between Carimata island and the west coast of Borneo, experienced a current setting to the N.W., at the rate of 3½ to 4 knots an hour.

ISLANDS AND DANGERS SOUTHWARD OF BILLITON.

A description of that portion of the dangers southward of Billiton, which lie contiguous to Gaspar strait, is given at page 277. The following islands and dangers lie nearer Carimata strait, and are important to vessels approaching it from the southward.

KEBATOE, or Shoe Island; the position of which, as determined by H.M.S. *Nassau* in 1876, is lat. 3° 47′ 45″ S., long. 108° 4′ E., (depending upon the longitude of Fullerton battery Singapore, being in 103° 51′ 18″ E.), it is nearly half a mile long in an east and west direction, 400 yards broad; conical in shape, thickly wooded, and 346 feet high. The island is steep-to, with a coast or fringing reef extending one cable from the north and west sides; and half a cable from the south and east sides. This island, situated on the western side of the south entrance to Carimata strait, and being seen from a long distance, forms an excellent object to make for when entering the strait from the south-westward.†

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* *See* Admiralty Wind and Current charts, for Pacific, Atlantic, and Indian oceans, 1872.

† A rock, said to exist N.W. by W. ½ W., 8 miles distant from Kebatoe island, was carefully searched for by the boats of H.M.S. *Nassau*, but could not be found. The depth of 14 fathoms (mud bottom) was obtained; from the nature of the examination non-existence of the rock in the position assigned to it is assured.

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WHITE ISLAND, 57 feet high, wedge shaped and of a white colour, having a few stunted trees on the top, lies S.W. one mile from Kebatoe island. A small shoal, with 6 feet water, lies N.E. ½ E., 3 cables from White island ; there are 8 fathoms close to the north-east side of this shoal, and 10 fathoms between it and White island.

ZEPHYR ROCK, formerly supposed to lie W. ¼ S., 4 miles from Kebatoe island, was searched for by the boats of H.M.S. *Nassau*, when a depth of 14 fathoms, mud bottom, was obtained in that position ; but at a distance of three quarters of a mile W. by S. from Kebatoe, and 6 cables N.N.W. ¼ W. from White island, a rock, on which the sea generally breaks, having 3 feet over it, was found, and this position has been assumed for that of the Zephyr rock.

KARANG KAWAT, or Grace Reefs, consist of two coral reefs, the centres of which lie N.E. by N. 4⅛, and 6½ miles respectively from Kebatoe island.

The southern reef, on which the sea breaks heavily in moderate weather, is awash at low water ; this reef is 3½ cables long in an east and west direction, and 2 cables broad, with 12 to 17 fathoms at the distance of three quarters of a cable.

The northern reef is 3 cables long in an east and west direction, 2 cables broad, dries 4 feet at low water, and has 13 to 16 fathoms at the distance of half a cable.

CHANNELS.—Between Kebatoe island and the southern Karang Kawat there is a clear channel 3¾ miles wide, with depths of 14 to 17 fathoms, mud bottom ; and between the southern and northern Karang Kawats there is a channel 1¾ miles wide, having also 14 to 17 fathoms, mud ; the holding ground in both these channels is good.

CAUTION.—A vessel ought never to attempt the passage inside Kebatoe island, except in very clear and favourable weather.

HEROINE SHOAL.—Horsburgh give the position of this shoal as lat. 3° 33½′ S., long. about 107° 52′ E. ; the Admiralty chart lat. 3° 37′ S., long. 107° 46′ E. ; its exact position is, however, doubtful. It is reported to be an extensive shoal on which the sea breaks ; and when passed at about the distance of 1½ miles, Two-peaked mountain on Billiton bore N.N.W. ; a small island N.E. by E. ½ E. ; and Shoe island, seen from the mizen-hrosuds, S.E.

Heroine shoal was unsuccessfully searched for by H.M. surveying vessel *Nassau* in 1876.

KATAPANG ISLAND, the position of which is doubtful, is said to lie in lat. 3° 23′ S., long. 107° 55½′ E. ; it is a low, wooded island about a third of a mile in diameter, and surrounded by a reef. Around it

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are soundings of 8 and 9 fathoms, and the same depths between it and the shore, where however, no vessel should venture.

SOUTH, EAST, AND NORTH COASTS OF BILLITON, WITH THE ADJACENT ISLANDS AND DANGERS.

The whole of these coasts are but very imperfectly known, but it is certain that they are fronted by many dangers, and vessels are strongly advised to avoid them. The following information is principally from Horsburgh, from passing vessels, and from the Admiralty charts :—

SOUTH COAST OF BILLITON.—From Krawang point, the south-west extreme of Billiton, the coast trends to the eastward for 2 or 3 miles, and then turns sharply to the north-eastward, forming a deep bay, the eastern horn of which is the most southern point of the island, and is distant 21 miles eastward from Krawang point. This bay is named Telok Batoh, which in the Malay language signifies rocky bay, and it appears from the chart to be full of dangers, with others extending some 2 or 3 miles outside its chord. Southward and westward from the eastern horn of the bay are some small islets lying within the margin of the reef which projects from the point.

TIDES.—The *Warren Hastings*, in May, passed between the south-east end of Billiton and the reefs in the offing, and found regular tides setting nearly East and West, from 1½ to 2 miles per hour.

EAST COAST of BILLITON.—From the eastern point of Telok Batoh hay, the coast trends East-northerly for 6 or 7 miles, to the south-east point of the island, 9 or 10 miles north-east of which is a prominent point named Sakapar. Between these two latter points is a bay, in which are several islands ; and fronting it are the islands of Serukat, Meray, and many others not named in the chart. N. by E. ¼ E. 17 miles from Sekapar point is Mangar point, having a hill upon it, the coast between forming a bay 2 or 3 miles deep. Northward of Mangar point is another small bay, and 4 or 5 miles distant from it is a point from which the coast rounds away, and forms the north-east shore of the island.

The whole east side of Billiton is fronted by several groups of small islands, most of them being surrounded with or connected by rocks, sands, and shoals. There is a large range of these islands in about lat. 3° 13′ S., through which the *Warren Hastings* passed, between a long island to the eastward and a small round one to the westward, having extensive reefs projecting from them. The soundings were pretty regular in the channel between the reefs, decreasing to 6 and 5½ fathoms on the western side, and increasing to 13 fathoms abreast the reef projecting from the

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easternmost island. There are nine islands to the eastward of this passage, and a great number on the west side towards Billiton.

The islands and dangers adjacent to the east coast of Billiton are, however, so imperfectly known, that it is not possible to give any accurate description of them here. They do not lie in the track of ordinary navigation, and if a vessel ventures near them she must do so with caution and judgment, and without placing too great confidence in the chart.

SCHARVOGEL ISLANDS are a group of seven islands, from 90 to 120 feet high, and thickly wooded, the easternmost of which by the chart is in lat. 3° 17′ S., long. 108° 27½′ E. Between the northern island and the Meray group, is a channel 3 or 4 miles wide, with 5 to 9 fathoms water in it. There are numerous reefs and sand banks between the islands and each appears to be surrounded by a reef.

The relative positions of these islands with each other are uncertain.

A BANK that dries has been observed about 7 miles off the east coast of Billiton island; from the bank Selandok island bears S.W. ½ W., Boerong Gantong island W. by S., and Goessong Madau island N.W. ½ W.

A REEF with about 6 or 7 feet water lies about 22 miles off the east coast of Billiton island; from the reef Selandok island bears W. ¾ S., and Liendong, one of the Scharvogel islands, S.S.W.

ADMIRAL PROTET SHOAL, with 6 feet water, the position of which is doubtful, is said to be in latitude 2° 58½′ S., longitude 108° 34′ E. H.M. surveying vessel *Nassau*, 1876, obtained 15 fathoms, one mile E. ½ N., of this position.

NORTH-EAST and NORTH COASTS of BILLITON.—From the north-east point of Billiton the coast rounds gradually to the north-west, and then takes a general direction about N.W. by W. to the N.W. Hook or point. Between some of the points along the coast are bays one or 2 miles deep; but in two places the land falls farther back, forming what appear to be the entrances of rivers. The aspect of the coast is high, uneven land, visible in clear weather 24 or 25 miles off.

Adjacent to these coasts are several islands and dangers, which, like those lying off the other coasts, are, for the most part, very imperfectly known.

MEMPERAK, and SADONG, are two small islands lying 7 miles to the eastward of Lolo point, the north-east point of Billiton island; Memperak the southern of the two islands is low and has two tufts in the centre; Sadong is low and flat.

BAKAN, and MERANAI, are two small islands situated on a bank 3½ miles to the northward of Sadong island; Bakan is round topped with a tuft on it; Meranai situated about a mile to the northward of Bakan,

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is low and flat; half a mile to the north-eastward of Meranai, lies a small islet 18 feet high, covered with bushes.

A REEF about 1¼ miles long in a N. by W., and S. by E. direction, and half a mile broad, lies 10 miles E. ¼ N., from Bakan island, on the north end of the reef stands a small, wooded islet 10 feet high, and nearly a mile N.N.E. from this islet lies a rock 10 feet above water.

NAPIER ISLAND, 95 feet high, lies E. by N. 10½ miles from Meranai. Napier island is 1½ miles in extent from east to west, and wooded; one mile S.E. ½ S. from the island lies a sand bank one mile long in an E. by S. ½ S., and W. by N. ½ N. direction.

Soundings.—In the channel between Meranai and Napier islands, depths of 18 to 25 fathoms were obtained by the *Nassau*.

A REEF that dries, lies about 8 miles off the north-east coast of Billiton island, in latitude 2° 37′ S., longitude 108° 16′ E.; the reef is about 4 miles long E.S.E. and W.N.W. and about 2 miles broad.

PIGEON ISLAND, lying 3 or 4 miles off the coast, with the north-east extreme of Billiton bearing S.E. by S. ¼ S., and the north hill on Nangka (Tokokemo) island E. by N. ¼ N., distant 27 miles, is very small, and surrounded by rocks or patches of reef, which in directions north-west and south-east from the island, appear to extend more than a mile. Around are soundings from 9 to 16 fathoms.

About E. by N. ¾ N. 7 miles from the island, a small sand-bank was seen by the *Bellhaven* in 1857, probably at high water.

MAA SEN WAAL shoal, with 18 feet water, in lat. 2° 32′ 30″ S., long. 108° 22′ E., lies with Sambilan island in line with the south peak of Nangka island, bearing E. ½ N. distant about 6 miles.

TWO-FATHOMS PATCH.—A small rock or patch with 2 fathoms water over it is placed on the chart N.N.E. 7 miles from Pigeon island. Around it are soundings of 19 and 20 fathoms, with 27 and 24 fathoms at 3 or 4 miles to the north-eastward.

HYDROGRAF ROCK, with 9 feet water, lies about 5½ miles off the coast, with Kran island, bearing S.E. ¼ S.; Malch island South; and a small island near Siantoe point S.W. by W. ¾ W.

REPORTED REEF.—The British ship *Empress of China*, 1877, was reported to have struck on a reef about 7 miles from the north coast of Billiton, in lat. 2° 44″ S., long. 107° 49′ E.*

There are other islets and dangers between Pigeon island and the N.W. point of Billiton, some of them at 3 or 4 miles from the shore. Their exact positions, however, are not known, and the mariner, if he approach

* *Shipping and Mercantile Gazette, 5th July* 1877.

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this shore, which there appears to be no good reason for doing, must do so with caution.

ISLANDS AND DANGERS IN THE FAIRWAY BETWEEN BILLITON AND BORNEO.

BOWER SHOAL, discovered by the *Nassau*, 1876, in lat. 3° 28′ 45″ S., long. 108° 40′ 30″ E., is a coral patch three-quarters of a cable in extent, having 9 feet water on it, and 9 to 11 fathoms close around.

DISCOVERY West bank (Ayer Masien), in lat. 3° 38′ S., long. 108° 44′ 30″ E., is composed of coral, 6 cables long north and south, and 2 cables broad, having near its western edge a small sand bank, awash at high-water springs. There are depths of 16 to 20 fathoms around Discovery West bank at a distance of three-quarters of a cable.

DISCOVERY REEF lies N.E. by E. ½ E. 5¼ miles from Discovery West bank, and is in lat. 3° 35′ 45″ S., long. 108° 49′ 25″ E.; this reef is 2 cables in diameter, having several coral heads awash at high water, and 14 to 22 fathoms around it at the distance of one cable.

DISCOVERY East bank* (Manpango), in lat. 3° 34′ 40″ S., long. 109° 12′ 35″ E., is 4½ cables long in a north and south direction, and 1½ cables broad, having in its centre a decayed white coral ridge 2 cables long, a few yards broad, and 5 feet above high water; there are 14 to 24 fathoms, sand, around this bank, at a distance of one cable.

Discovery East bank is visible from aloft on a clear day at a distance of 7 to 8 miles.

LAVENDER BANK (Dyuruh), in lat. 3° 24′ 5″ S., long. 109° 1′ 30″ E., is 7 cables long in a N.N.W. and S.S.E. direction, and two cables broad; it is composed of coral, with several large boulders awash at high water; around this bank there is a depth of 20 fathoms, sand and shells, at the distance of a cable.

During a south-easterly breeze the sea on Lavender bank has been observed from aloft to break at a distance of 6 miles.

CIRENCESTER BANK (Batuan), in lat. 3° 14′ 30″ S., long. 108° 59′ E., is half a mile long in a N.N.W. and S.S.E. direction, and one cable broad, it is chiefly composed of live coral heads with one to 3 fathoms

* From the following remarks in possession of Captain Stephen Stocker, R.N., who was mate of H.M.S. *Hecate* in 1813, it would appear that this bank was discovered by that vessel:—"Steering to the southward out of Carimata strait, we discovered a "dry sand-bank 12 or 13 feet above water in about lat. 3° 40′ S., long. 109° 4′ E. "Passed about three-quarters of a mile eastward of it, and had soundings of 21 to 25 "fathoms."

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between them ; at 1½ cables within the northern extreme of this bank there is a flat circular patch of dead coral awash at low-water springs, one cable wide, having on its western edge a boulder awash at high water. There are depths of 19 to 34 fathoms at the distance of one cable around Cirencester bank.

OSTERLY South shoal, in lat. 3° 19′ S., long. 108° 37′ E., is 2 cables in extent north and south, with 6 to 12 feet water on it, and 10 to 14 fathoms close around ; near the centre of this shoal there is a white, dead coral islet about 40 feet long, and 3 feet above high water.

OSTERLY North shoal, situated about $1\frac{9}{10}$ miles N.E. from the islet on Osterly South shoal, is about a quarter of a mile in extent, awash at low water, and has from 10 to 15 fathoms close around. By day this shoal may be distinguished by the greenish tint of the water ; but at night it is exceedingly dangerous to vessels passing eastward of the Scharvogel islands.

Tides.—In the vicinity of these shoals the ebb tide was observed to set to the southward and the flood to the northward.

CIRENCESTER SHOAL, in lat. 2° 54½′ S., long. 108° 56′ E., was seen by the *Cirencester* on the same day that she discovered the sand-bank described above. The least depth found upon it was 2 fathoms at ow water, and there is probably 3½ fathoms on it at high tide ; close around, the soundings were 17, 16, and 15 fathoms. The shoal is narrow, and not more than 100 yards in length, north and south. It was not discovered by the boats sounding for it until the rocks were seen under the bottom.

MONTARAN ISLANDS (Momprang), lying off the north-east part of Billiton, consist of three straggling groups, which, with the many dangers that lie near them, are very imperfectly known, and it is not possible to get the bearings of the different objects said to have been taken upon or near several of the dangers to agree. The navigator is, therefore, cautioned to be very vigilant when near these islands, or, what is better, to give them a wide berth.

The *Warren Hastings* of Calcutta (1789) found a safe passage between two of the groups of the Montaran islands, and had soundings 17 to 26 fathoms ; when the extremities of the islands bore from E. ½ N. to S.W. by W., distant from the nearest 4 or 5 miles, a long reef of sand and breakers bore from N.W. to W.S.W., about three-quarters of a mile, near to which she anchored in 7 fathoms in the night.

Nangka (Tokokemo), the largest and highest of the Montaran islands, has a high hill on each extreme (the southern peak is 650 feet high), and being low in the middle, appears like two islands till within

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8 or 9 miles of it; but it cannot be mistaken when a vessel is 17 or 18 miles to the northward, as none of the low islands near Nangka are seen at that distance.

Close to the N.E. point of Nangka, on the reef which extends about 1½ miles to the northward, lies Tekong Gemok islet covered with bushes; a reef projects also about half a mile from the south point of the island. A reef lies 6 miles N.W. ½ N. from the north end of Nangka ;* and about a mile westward of Nangka is a small round island with a white beach, surrounded by a reef.

WEST GROUP.—About 2½ miles S. by E. from Nangka are three low islands, named West group, with apparently much broken water about them, and a high white sand-bank about 4 miles south-eastward of them.

About 7 miles E.S.E. from Nangka lies a dangerous reef of rocks, very little above water.

MIDDLE GROUP, consists of four or five islands, lying from 8 to 12 miles to the eastward of West group. The southernmost island is in lat. 2° 37′ S., and when approached by *H.M.S. Fox*, it appeared to be inhabited, and the water very shoal around,† for the Malays were observed pushing a boat along with poles, although 3 miles off the islands.

Luctor Reef, on which the Dutch barque Luctor and Emergo touched, lies with Nangka island bearing West; East island E. ¾ N.; and the westernmost of the middle group S. by E.

East Island, at the eastern extremity of the group, in lat. 2° 29′ S., long. 108° 50′ E., is about half a mile in extent north and south; this island is of coral formation, thickly wooded, and surrounded by a sandy beach, the trees in the centre forming a sharply pointed summit 130 feet high, making the island conspicuous and easily recognised when seen from a distance; on the western side of the island rocks were seen above water about one cable from the shore, there is also a sand bank about one mile N. by W. from this island. Skeletons of turtle were seen on East island, so that it may be assumed they visit to deposit their eggs.

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* Mr. Hall, commander of the barque *Catharine*, when passing this island with its centre bearing S.E. ½ S., and with the beach visible half way down the rigging, observed a coral reef near the vessel, which appeared connected with the island, and to have not more than 5 feet water upon it.—Naut. Mag. 1841.

† It appears to have been upon one of the reefs off these islands that the *Abercrombie* was lost, a fine ship of 1,200 tons burthen, belonging to Bombay. She was steering N.W. by N. in the night among the dangers that lie off the east coast of Billiton although land was seen bearing N.W.; she struck on a reef with dry rocks on it, extending about a mile to the north-west; the Journal states it to be in lat. 2° 29′ S., the centre of Billiton bearing S.W. by S.—Horsburgh.

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A sand-bank was seen by an officer of the *Discovery*, bearing S. 64½° E. distant about 4 or 5 miles from East island.*

Small island, 1¾ miles S.S.W. ½ W. from East island, flat and covered with trees in the centre, appeared to be about the same length as East island. The channel between these islands is said to be shallow.

A sand-bank having a few patches above water was seen from the *Sylvia's* boat, about one mile E. by S. from East island; the bank appeared about three-quarters of a mile long, in an east and west direction, but it was not examined.

CATHARINE, or EVANS REEF.—The dangers near East island seem as yet to be but imperfectly known. The ship *Catharine*, Capt. Evans, at 2h. 15m. p.m. Dec. 17th, 1840, struck on a ledge of rocks, with East island bearing W. ½ N., distant 8 miles, and Carimata peak N. 4° W. This reef, which is formed of sharp coral rocks, extends N.W. and S.E. a cable's length, and the least water found on it was 2 fathoms. While aground, soundings were obtained in different directions: they were 4 to 9 fathoms about 100 yards north-west of the ship, and to the south-east, a little less than a cable distant, no bottom with 20 fathoms; at half a cable 9 fathoms; and a boat's length nearer the ship, 2¾ fathoms. Though a strong current was setting to the southward, there was no appearance of broken or discoloured water, nor any indication which would cause a careful navigator to apprehend danger. Captain Evans placed the reef in lat. 2° 31½′ S., long. 108° 57′ E.

The barque *Justina*, of Batavia, belonging to Messrs. Maclaine, Watson, and Co., having been despatched to the wreck of the *Catharine*, anchored in 18 fathoms (mud) with the centre of East island bearing W. ¾ N. distant 6 miles, and a shoal W. by S., 2 miles. About 100 yards distant around the shoal, there were depths of 10 to 18 fathoms shoaling suddenly towards it, the *Justina's* boat went over it and had very irregular soundings, from 4 feet to 5 fathoms, rocky bottom; in the centre of the shoal there was a coral rock 3 feet above water. About a ship's length from this shoal, shoal water extends from W.N.W to E.S.E. about 1½ miles, with 4 to 10 fathoms rock bottom. This shoal from its position must have been the sand bank mentioned above, as seen by the officers of the *Discovery*. The *Justina* appears to have anchored 2 miles to the westward of the Catharine reef: she was at anchor only four hours when the chain cable parted, which prevented a further investigation of the locality.† This reef was unsuccessfully

* Horsburgh, Vol. II., seventh edition, page 646.

† Nautical Magazine, Vol. X., 1861, page 672.

From the *Sylvia's* survey (1876), it appears probable that the sand bank seen by the officer of the *Discovery*, the shoal examined by the *Justina*, and the sand-bank seen from the *Sylvia's* boat are identical.

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searched for by the boats of H.M.S. *Sylvia*, in the position given by the master of the *Catharine*.

During the examination, however, a shoal having 4½ fathoms on it and 8 to 17 fathoms close around, was found at 4½ miles E. ¼ S. from East island; or in lat. 2° 31′ 30″ S., long. 101° 54′ 30″ E. This position from which Carimata peak bears N. 3¼° W. has been accepted as that of Catharine or Evans reef.

Although 4½ fathoms was the least depth obtained by the *Sylvia*, it was considered probable that less water might be found. Also that other shoal ground existed in the neighbourhood.

CORCYRA SHOAL.—Horsburgh remarks that "the *Corcyra*, Captain Walison, in August 1858, discovered a shoal of 15 feet water, about half a cable in circumference, with Round hill on Billiton bearing S. 57° W., and Tekong Gemok islet just open of Nangka N. 61° E.;" but these bearings will not lay down upon the chart.

CONDOR BANK, with 3 fathoms water, in lat. 2° 22′ 20″ S., long. 108° 37′ 15″ E., lies N. by E. ½ E. 8½ miles from Nangka island.

ONTARIO REEF, the centre of which is in lat. 2° 1¾′ S., long. 108° 39′ E., is very dangerous, as it lies in the direct tract formerly recommended to ships when passing between Soruetou and Billiton. It is composed of sharp spiral rocks, with the tops of some of them dry at low water spring tides; but the small break against their sharp points cannot be distinguished from the topping of a common sea; and the reef is steep-to, having 18 and 19 fathoms at a ship's length from the rocks. From the wreck of the *Ontario* the north-eastern end of the Quoin (on the western part of Soruetou, was just shut in with the western end of Soruetou; the east end of Soruetou bearing N.N.E. was open about a quarter of a point from the west end of Carimata. The soundings are no guide in the approach to this dangerous reef, there being 23 and 24 fathoms close to it on the north and east sides, 18 to 25 fathoms nearly close to the rocks on the west side, and 25 fathoms, clay, at the distance of a cable.

This reef was examined by Captain Ross, I.N., in the surveying ship *Discovery*, who found it half a mile in extent W.N.W. and E.S.E.; the boat had 1½ fathoms on it about high water, and in many places the depth appeared to be less. When at anchor in 21 fathoms, on a mud bottom, with the reef bearing W. by S., distant a mille, the altitude of the highest part of Soruetou was 39′ 30″;* the eastern end of Soruetou N. 24° E.; the highest land of Carimata N. 32¼° E.; and one of the Montaran islands, visible from the main-top, S. 6¼° W.

* Horsburgh.

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WALLER ROCK, of doubtful existence, is said to have less than 6 feet water on it, and to lie about 3½ miles westward of the Ontario reef. The rock is placed on the chart in lat. 2° 1¾′ S., long. 108° 34′ E.

FLORENCE ADELAIDE REEF.—The British ship *Florence Adelaide*, bound from Cardiff to Singapore in 1863, was reported to have been wrecked on a supposed coral reef, lying in about lat. 2° S., long 108° E. The reef had 16 feet water on it in the place where the vessel struck, but its extent and the least depth over it was not ascertained.

RIVAL REEF we have no account of. It is marked on the chart with 5½ fathoms over it, rocky bottom, in lat. 1° 47′ S., long. 108° 15½′ E.

SORUETOU ISLAND, about 6 miles long east and west, 2 miles broad, 1,400 feet high, and visible 28 or 30 miles off, forms the north-eastern limit of the broad main channel of Carimata strait. The western point of the island is in lat. 1° 42½′ S., long. 108° 39½′ E., and on it is a hummock, which has been mistaken for a small island, and named the Quoin from its appearance. About 2 or 3 miles off the west end of the island the depths are 20 to 24 fathoms.

Horsburgh says that "breakers were said to have been seen from the mast-head of the ship *Aurora*, bearing S. by W. ½ W., distant about 3 miles, when the eastern extremity of Soruetou bore E. by N. ¼ N., the other extreme being obscured by clouds."

Water.—At a sandy beach on the south side of Soruetou, and near the east point, there is a good watering place, but high tide is required for a large boat to get over a reef, near to which there is anchorage in 7 fathoms, mud. It is said, also, that fresh water can be obtained at the west end of the island (at the foot of a hill of moderate height) where a vessel may anchor in 10 fathoms.

CARIMATA ISLAND lies north-eastward of Soruetou, from which it is separated by a narrow channel. It is about 11 miles in extent east and west, 7 miles north and south, and near its centre is a peak rising to an elevation of 2,000 feet,* which may be seen at the distance of about 45 miles. On the south-west end of the island are some hot springs.

Reefs and dangers extend off the east and south coasts of Carimata; and at 6½ miles S.S.E. from the south point of the island is a gravel bank, having 4 fathoms water over it. Two rocks above water with others below the surface appear to lie 3 or 4 miles off the middle part of the west coast; and off the north-west point of the island are numerous islets and rocks, the outer one of which, Tongado island, is 3 miles westward of the point.

* The late Lieutenant Raper, R.N., gives the height as 2,986 feet.

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The channel between Soruetou and the reef which extends from the south coast of Carimata is about 2 miles wide, with depths of 10 to 17 fathoms; but no object is to be gained by using it.

JAMSETTÜ REEF, with 19 feet water over it, lies 7 miles N. by W. ¾ W. from the north point of Carimata island, and N.E. ½ N. 10½ miles from Tongado island.

LEEMA ISLES are a group of small islets lying North about 18 miles from the northern side of Carimata; near them the soundings are 12 to 14 fathoms.

WELLESLEY SHOAL is said to lie in lat. 1° 18′ S., long. 108° 34½′ E., but its position is doubtful.

CRESCENT SHOAL, also of doubtful existence, is said to lie in lat. 1° 10′ S., long. 108° 38′ E.

ERIKSON SHOAL, in lat. 1° 5′ S., long. 108° 29′ E., has 4¾ fathoms water on it, there are 14 fathoms a mile N.W., 19 fathoms a mile S.E., and 11 fathoms nearly a mile South of the shoal.

CHINA SHOAL, with 12 feet water on it and 11 to 12 close around, lies in lat. 1° 1′ S., long. 108° 30′ E.

GREIG SHOAL, discovered by Captain William Greig, of the ship *Lord Minto*, was found to extend from lat. 0° 52′ to 0° 58′ S., long. 108° 37′ E.; the longitude, however, cannot be relied upon as being correct; 5 fathoms water were found within the extent given above, but on the extremes of the shoal the vessel was often in nearly the same depth of water as she was drawing, namely, 13 feet, and this was in steering between much shoaler spots, with the body of Carimata then seen from the deck, bearing between S.S.E. ¾ E., and S.E. by S.; the least water found was 12 feet.

From a subsequent examination, a circular space about 1¼ cables in diameter having 8 feet water, was found on Greig shoal; it lies in lat. 0° 55′ 36″ S., long. 108° 28′ E., with Panambungan island bearing E.S.E.; and the peak of Carimata island S.S.E. ¾ E.

Captain G. Croot of the ship *Columbus*, 1869, reports having obtained soundings in 5 fathoms, bottom hard sand, or rock, in lat. 0° 51′ S., long. 108° 16′ E., about 13 miles W. by N. ¾ N. from the shoalest part of Greig shoal.

WEST COAST OF BORNEO; SAMBAR POINT TO MASIEN TIEGA ISLANDS, WITH THE ADJACENT ISLANDS AND DANGERS.

The southern part of the west coast of Borneo, from Sambar point its south-west extreme to abreast of the Masien Tiega islets, is very im-

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perfectly known. At present it is only visited by small vessels, mostly owned and commanded by Chinamen or Malays connected either with the Dutch settlements in Borneo and Java, or with Singapore.

Between Sambar point and mount Minto the coast recedes and forms two bays. Mount Minto is upon the north point of the northern bay, and about 16 miles S.E. by E. ½ E. from it is a high peak. The islands of Mankap, Gelam or Laag, Kumpal, and some smaller ones, together with several dangers, lie off this part of the coast, and are described in page
N. by W., distant 22 miles from mount Minto point is Bree point, the coast between forming a bay 5 or 6 miles deep, in which are several small rivers. Close to the northward of Bree point is the Pawang river, which has two entrances, separated by an island 3 or 4 miles in breadth. At the mouth of the southern entrance is a small islet named Odang, and at the mouth of the northern entrance there is another islet, named Pajong.

From the entrance of the Pawang the coast trends with an irregular outline in a general North direction for about 45 miles, to the entrance of the large river Simpang. On this part of the coast are several small rivers, and about midway between the Pawang and Simpang are the islets Sepadian, Tjampedak, Dato, &c., with the islands of Joanta and Batoang 7 or 8 miles in the offing. About 7 miles southward of the entrance of the Simpang is the island of Palintoan, lying close to a point of the coast, inside of which on a small river is the town of Pambarawang. Two or 3 miles southward of Pambarawang is the town of Succadanar. There is good anchorage in 3 or 4 fathoms in the roadstead off these towns, with a group of small islands to the southward.

Horsburgh remarks that the coast above described is low land, and that it has seldom been approached under 12 or 10 fathoms, being fronted by islets or rocky ground in some parts.

From the entrance of the Simpang river, the coast trends for about 40 miles in a E.N.E. direction to a point about 4 miles north-eastward of the Masien Tiega islands. On this part of the coast are several other islands, and separated from it by a very narrow channel, is the large island of Mayang, which is principally low land, but near its south-western end is a high hill, mount Marang; and near its north-western end a long range fronting the sea, named mount Mayak.

WILLEM BANK in lat. 3° 52′ 40″ S., long. 109° 42′ 40″ E., is about half a mile in extent north and south, and about one cable broad, having on it 3 fathoms water with 6 to 8 close-to.

HECTOR BANK.—Dangerous patches extend many miles to the southward of Sambar point, the south extreme of the coast just described,

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the most southern of which is the Hector bank, which is a 3½-fathoms patch of doubtful position, but placed on the chart in lat. 3° 46′ S., long. 110° 8′ E. Around it are from 6 to 10 fathoms.

FOX SHOAL is shown on the chart as two rocks awash N.W. by W. ½ W. and S.E. by E. ½ E. of each other, about 1½ miles apart, with a large patch with only 2 fathoms water over it, to the north-eastward of them, and 9 to 19 fathoms close to on their west and south sides. The westernmost rock is in lat. 3° 32′ S., long. 110° 7¾′ E.

ARUBA SHOAL, taken from the Dutch chart, is said to lie 3 or 4 miles N.E. by E. from the Fox shoal, and to have 3 fathoms water over it.

CLEMENCIA REEF, in lat. 3° 24′ S., long. 110° 7¾′ E., is nearly dry; around it are 7 to 17 fathoms.

From the Clemencia reef, shoals appear to extend all the way to Pulo Mankap, and vessels should be very cautious not to get too near them. Between Fox shoal and Hector bank there is a good channel by keeping between lat. 3° 36′ and 3° 42′ S.; but when the vessel's position is not correctly known it is advisable to pass to the southward of the Hector bank.

Soundings.—Horsburgh says, that although the bottom near and among these shoals is generally a mixture of red and green clay, with mud, yet the soundings are very irregular, with overfalls, making it prudent not to come under 15 or 16 fathoms towards them.

EUPHROSINE is a doubtful rock said to lie in lat. 3° 25½′ S., long. 109° 41′ E., or S.S.W. 16 miles from Oliviera reef.*

OLIVIERA REEF.—The *Nassau* passed 1½ miles East, and 1½ miles North of the position assigned to Oliviera reef from a Dutch chart of 1842 (namely, lat. 3° 10′ S., long. 109° 47′ E.), without observing any indication of shoal water; depths of 16 to 19 fathoms, sand, were obtained.

PULO MANKAP or Manco,† in lat. 3° 5′ S., long. 110° 13′ E., and distant about 8 miles south-west of Sambar point, is a small low island, which may be seen 15 miles from the deck of a large

* The shoal, reported by the steam vessel *Den Briel* to have been seen above water, and placed on Admiralty charts in lat. 3° 23′ S., long. 109° 27′ 30″ E., has been unsuccessfully searched for by H.M.S. *Nassau*:—depths of 18 to 22 fathoms, mud, having been obtained.

The *Nassau* during this examination was anchored one mile east of the above position for a day and a half, the weather at the time being clear with a light south-east trade wind blowing, when any rocks above water within the radius of 5 miles must have been seen.

Den Briel shoal has on this authority been removed from the charts.

† Manco signifies a bason, bowl, or cup in the Malay language.

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vessel. Near to it, to the N.N.E., are three other small isles, which appeared to Captain Ross, when examining the surrounding shoal, as three bushy islets or rocks. It was noticed in the last page that there is shoal water to the southward of Pulo Mankap, as far as the Clemencia reef; shoal water also extends far to the westward of it, and vessels must be cautious in approaching the island from both those directions. Captain Ross, in the *Discovery*, with the island bearing East, distant 10 miles, got suddenly into 4 and 3¾ fathoms, hard sand, on the shoal bank that encircles the island; when it bore N.E. about 7 miles, the soundings were 3¾ fathoms, fine sand; and when bearing N.N.E. ¼ E. 10 or 12 miles, the vessel struck on the ground.

Horsburgh says, Pulo Mankap ought not to be brought to the northward of N.E. by N. while in sight from the mast-head, for if it bear N.N.E. ¼ E., about 18 miles distant, a vessel will suddenly get into shoal water on some of the spits that stretch far to the southward, having from 10 to 17 fathoms, soft bottom, near them.

GELAM or Laag Island is the largest of a group of islands lying N.W. 9 or 10 miles from Sambar point. The whole are encompassed with reefs, and the shoal bank which extends 10 or 11 miles westward of Mankap island, also extends 5 or 6 miles westward of the Laag group.

PULO KUMPAL* or Rendezvous Island.—Captain Sir Edward Belcher visited this island in H.M.S. *Sulphur*, October 1840, and took up a safe berth within one mile of the west point (Sulphur point) of the island; and her tender the *Starling* occupied a position within one-eighth of a mile from the shore, but had rocky bottom. A plan was made of the anchorage, and the results of the examination proved it to be much safer and more convenient than the chart or sailing directions led to expect, admirably adapted to replenish fuel or correct chronometers, and with this object in view some pains were taken to connect it with the meridian of Singapore. The rocky portion of the island is composed of a mixture of contorted slaty and sandstone schist, traversed by veins of quartz, exhibiting slaggy indications at the point of contact, apparently ferruginous, but on examination did not affect a very delicate needle. Wood is abundant, but the search for water was unsuccessful.

This island was, in former times, the rendezvous for the China convoys in case of separation. The following is from Horsburgh:—The island extends about 12 miles to the north-eastward, and a chain of small islands

* The name Pulo Kumpal, means an island to which vessels resort. The west point of this island by Captain Ross is in lat. 2° 44½′ S., long. 110° 2½′ E., but Sir Edward Belcher places a ledge of rocks on the west point in long. 110° 7′ 39″ E., or 6° 16′ 21″ east of Singapore, and 9° 16′ 24″ west of Macassar.

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and reefs nearly joins it to the main ; this chain stretches also southward along the coast to Pulo Mankap, and is fronted with shoal water. About 6 miles S. by W. from the west point of the island is a bank with 3 or 3½ fathoms, which makes it proper in leaving the anchorage at the north-west part of the island to haul off to the south-westward, to give a berth to this bank. In July land and sea breezes prevailed, the former at East and E.S.E., veering to S.S.E. in a breeze. The island shows in hummocks, but cannot be seen above 16 or 17 miles, and the west point forms in a bluff, when viewed from the south-west or westward.

The *William Pitt*, in July, anchored in 4¾ fathoms, about 4 miles off shore, with the west point of Pulo Kumpal S. ½ W., its north point E. by N. ½ N., a small isle off the latter point E. by N. ¾ N., another isle E.N.E., a third small isle with trees on it North, just visible from the poop, and the north extreme of Borneo N.N.E. The first two islets are united by a coral reef which extends 2 miles N.N.W. from the second island, having near its extremity a large rock 20 feet above water ; from this rock in a north-east direction there is another island about 4 miles long, surrounded by coral reefs.

Although coral reefs, with sharp pointed rocks visible at low water, project from one to 3 miles from most parts of Pulo Kumpal, yet the western side appeared tolerably clear, with a sandy beach. From Sulphur point the land forms an elbow, by which there is shelter from all winds from the eastward, with smooth water.

Water.—Sir Edward Belcher did not find any water on the island, but Horsburgh states that the crew of the *William Pitt* dug wells above high-water mark on the sandy beach on the west side of the island, from which very good water was obtained.

Tides.—The tides were found to be more regular here than at any other part of the west coast of Borneo ; the rise and fall was 8 or 9 feet.

TOEKAN MENGKOEDOE, or Gilbert Rocks (Minto rocks of Horsburgh) are situated in lat. 2° 14′, and 4 or 5 miles off mount Minto point, with mount Minto bearing about E. ¾ N., and High peak about E. by S. ½ S.

Elliott Sand is a dry bank, a mile or two south-east of Gilbert rocks.

There is also a sand-bank with two dry coral heads, lying 3½ miles to the southward of Elliott sand.

Soundings.—About 16 or 18 miles off this part of the coast the depths are mostly from 14 to 17 fathoms. In hauling in for Pulo Kumpal they will decrease to 7, 6, or 5 fathoms near the reef that fringes its western point, and projects around it to the southward and eastward. About 4 miles outside the Gilbert rocks, the depths are 9 or 10 fathoms.

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ISLANDS, CHANNELS, AND DANGERS, BETWEEN CARIMATA ISLAND AND THE COAST OF BORNEO.

VOGELNEST, or Birds Nest Islands, are a group of small islands 3 or 4 miles in extent, and surrounded by a reef. The northernmost island, named Boorong, is in lat. 1° 43′ S., long. 109° 17′ E.

ZWARTE ROTS or Black Rock is 4 or 5 miles to the south-west of the Birds Nest group. There is a rock under water about half a mile eastward of it, a rock awash nearly a mile to the southward, and another awash the same distance to the south-westward.

Goan Reef with 16 feet water, lies S. by E. 6 miles from Zwarte Rots.

AMUR SHOAL with 9 feet water, on which the barque *Amur* struck in 1875, lies about 2 miles to the north-west of Vogelnest islands, and is in lat. 1° 41′ 30″ S., long. 109° 14′ E.

KRAWANG or South Island, about a mile in extent, lies about 4½ miles N.E. from the Birds Nest islands. Two smaller islands lie close to its north-west side, and a rock off its south-east side.

Ginting, Mintano, Grisse, and Bisi, are four small islands, the most eastern of which, Ginting, is in lat. 1° 41′ S., long. 109° 4½′ E.

Bisi is about 4½ miles from Carimata, to which it appears to be almost connected by a projecting reef.

LIESING or Bold, and TONGUE ISLANDS, form a group of four small islands. Bold, the most southern and western island of the group, bears North 3 miles from Ginting.

Steil, the eastern Tongue island, is very small. Bakong, the north Tongue island, has a reef projecting from it nearly 2 miles in a N.N.W. direction. Boom, the middle Tongue island, is about twice the size of the other two islands.

A REEF, about a mile in extent, lies 2 miles north-westward of Bold island.

PYRAMID or Boan, Nibong, and Helinet Islands.—Pyramid or Boan island is about 1½ miles in extent, and its centre is in about lat. 1° 29½′ S., long. 108° 59′ E. Nibong and Helinet are much smaller islands, lying about a mile northward of Pyramid.

The OSTERLY CHANNEL, through which the ship of that name passed, lies westward of the Birds Nest islands, Black rock, Bold island, and the reef north-westward of it, Pyramid, Nibong, and Helinet islands; and eastward of Ginting, the islands and reefs north-east of Bisi, and the east coast of Carimata. The narrowest part is between Bold island and the reefs extending eastward of Bisi, where it is but 1½ miles broad, with depths of 5 or 6 fathoms; westward of Black rock. the depths

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are 10 to 12 fathoms; and from 10 to 13 fathoms between Carimata and Pyramid island. The *Osterly* found this route very intricate, and several times had rocky bottom and very shoal water.

PAPAN ISLANDS form two small groups, between which is the Papan channel, about 1½ miles wide, having 9 to 12 fathoms water, with a rock near the centre between the groups. Maleidong, in lat. 1° 31′ S., long. 109° 22′ E., is the largest of the islands, and with two islets near its north side from the eastern group. The western group consists of three islands, nearly of the same size, the westernmost has a rock off its S.W. point; the remaining two are in line when bearing about N.E. ½ N. and S.W. ½ S.

Shoaler water than has hitherto been known, is said to exist N.E. of the Papan islands.

SPIRIT OF THE NORTH SHOAL.—The ship *Spirit of the North*, Charles Wise, commander, from Macao to London, September 21st, 1861, was reported to have struck on a shoal lying about 1½ miles N.W. of the north island of the western Papan group; the shoalest water obtained was 12 feet. There was no ripple on it, but small round white patches were indistinctly seen under the vessel's bottom.

A reef extends nearly 2 miles in a westerly and south-westerly direction from this shoal, having on its N.W. extreme a rock named Virginia.

GOERONG or Passage Islands are two small islands lying close together, 10 miles N.W. by W. ½ W. from the western group of the Papan islands.

A **ROCK** is marked on the chart, in lat. 1° 30′ S., long. 109° 5½′ E., but its position is doubtful.

TALLACK REEF in lat. 1° 21′ S., long. 109° 6′ E., has a depth of 18 feet on it, with 20 fathoms close around; from the reef Socka, the southern island of the Melapies islands bears N.W. ¾ W., distant about 2 miles; Pyramid island S.W. ¾ S.; and Zattak point just open north of Meledan or Button island.

MELAPIES ISLANDS comprise a group about 5 miles in extent, lying to the south-west of the high island of Panambungan. Three islands of the group are tolerably large and high, with several contiguous islets, the north-eastern of which, Double island, lies about 2½ miles from the south-west extreme of Panambungan.

RODGERS REEF.—In 1857 Mr. Rodgers, master of an English ship, discovered a shoal with probably less than 4 fathoms water on it, the east point of Carimata island bearing S. ½ W., and the Leema islands W. by N. ½ N.

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MELEDAN or Button Island lies about 9 miles eastward of the Melapies group, and about 6½ miles E. by S. ½ S. from the south-west point of Panambungan.

PANAMBUNGAN ISLAND is high, 5 miles in extent N.E. and S.W., and its western point is in lat. 1° 12′ S., long. 109° 10′ E. There are four small islets off its eastern extreme, the outermost of which is 4 miles N. by W. ½ W. from Button island; there is also a small islet, named Sirie, lying off its south-western extreme.

Anchorage and Water.—There is good anchorage off the north-western side of Panambungan, in 5½ or 6 fathoms, with shelter from southerly winds. Fresh-water bay, at this part of the island, has two runs of good water, the westernmost of which is the largest, where the water is obtained behind a large black rock on the beach; the boats may approach close, or the casks can be landed on the beach, which consists of fine sand. The *William Pitt* anchored in 5¾ fathoms, soft mud, with the island S. ½ E. to N.E. off shore 1¼ miles, and off the watering place 2 miles; the first and best watering place bearing E. by S. ¼ S.; second watering-place S.E. by E.; third watering place S.E., and Maisien Tiega islands N. ½ E. All these watering places are fronted by fine sandy beaches, and easily discerned. There are spars fit for topmasts on the island, but the trees seem to be too heavy.

ANTOE or Baroe, and Ananas Islands are the largest and outermost of a group of small islands lying off the north-western extreme of Mayang islands.

MASIEN TIEGA are three small islands, the outer or westernmost of which is in lat. 0° 55′ S., long. 109° 12′ E. The chart shows a reef extending from them to the south-west.

GREIG CHANNEL is the passage between Panambungan and the Melapies islands, and the route by it and among the islands to the south-eastward, although narrow in some parts, has moderate depths with generally good anchorage, and seems preferable to the route westward of Carimata and Soruetou, for vessels that have to work along the coast against the monsoon, whether bound northward or southward.

Directions.—Being to the northward of the dangers off Minto point (page 322), the Borneo coast may be approached to 9 or 8 fathoms water, and to 7 or 6 fathoms when nearing the Papan islands. The Birds Nest islands should not be approached under 10 fathoms, or nearer than 2 miles. A vessel may pass on either side of the two groups of the Papan islands, observing that the water quickly shoals to 5 fathoms eastward, or inshore of them. If passing westward of them remember the Spirit of the North shoal (page 323). Between South island and the

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Papan islands the depths are 10 to 12 fathoms, decreasing pretty regularly towards the Borneo coast; and between the Papan and Passage islands there are 7 to 12 fathoms. Northward of the Papan islands the soundings appear to shoal rather suddenly from 8 to 5 fathoms, but gradually under that depth. The Greig channel appears to be bold towards either shore with depths from 14 to 20 fathoms in the fairway.

When northward of Panambungan, the Borneo coast may be approached to 9 or 8 fathoms at discretion, but under 8 fathoms the soundings seem to decrease rather quickly. A vessel may stand off to 15 fathoms near the Leema islands, and to 17 or 20 fathoms when to the northward of them, but remember the Wellesley, Crescent, China, and Greig shoals.

The Inner Channel, between the east end of Panambungan and the south-west extreme of Mayang island, may be used by small vessels, as it has regular soundings of 3 or 5 fathoms, soft bottom.

Soundings.—The soundings near the different dangers lying in the main channel of Carimata strait, have already been given; it will, therefore, be only necessary here to refer to the soundings in the fairway of the channel.

In lat. 3° 32′ S., or 7 or 8 miles southward of Euphrosine rock (page 319), is a bank of 9 and 10 fathoms, which does not appear to have been properly sounded over, and it is possible that less water may be found upon it. In the fairway of the main channel, between Euphrosine rock and Discovery East bank, the soundings vary from 19 to 28 fathoms. Eastward of the Montaran islands are 14 to 17 fathoms in the middle of the channel, increasing to 23 or 25 fathoms towards Catherine reef. Between the Montaran islands and Ontario reef there are 20 to 23 fathoms; and from 17 or 18 to 22 and 25 fathoms between Ontario reef and Soruetou; from thence towards Greig shoal are 21 to 25 fathoms.

Tides.—In the southern portion of Carimata strait, between the parallels of 3° and 4° S., and the meridians of 107° 30′ and 109° 30′ E., during the south-east monsoon, only one high water in 24 hours was experienced and the times were so irregular that no establishment could be given.

During fine weather the flood tide sets to the north-west for 14 hours, at the rate of 2 to 3 knots an hour, and the ebb to the eastward 7 hours, one to 2 knots an hour. With a strong south-east wind the ebb is scarcely perceptible, but the flood increases in strength and duration.*

Directions through Carimata Strait from the Southward.—Approaching Carimata strait from the southward, a vessel will have to depend principally upon the correctness of her reckoning, for the soundings are so irregular that they will afford but very imperfect guidance, and the land is too distant to be of service in determining

* Commander R. H. Napier, H.M. Surveying vessel *Nassau*, 1876.

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her position. If to the westward of about long. 108° to 108° 20′, a good look-out should be kept to get sight of Shoe island (page 306), which, if seen, will determine her position, and enable her to steer to pass into the strait, either by the main route eastward of the Discovery, Lavender, and Cirencester shoals, or by the route westward of those dangers, between them and the Osterly shoals.

Should the vessel be to the eastward of 109° 30′, and approaching the parallel of 4° S., the greatest care must be observed to keep to the westward of the dangers which extend about 42 miles S. by W. from Mankap island; and the navigator must be guided by circumstances as to whether he shall proceed eastward or westward of Euphrosine rock and Oliviera reef. It is often advantageous, on account of the tide, to pass inside those dangers, but it is much better, if possible, to keep the main channel. Having passed Pulo Kumpal (or Rendezvous island), a course may be shaped to pass on either side of the Ontario reef. Carimata, Soruetou, and the adjacent islands will afford good objects for determining the vessel's position if she pass northward of the reef, and the Montaran islands will answer a similar purpose if she pass southward.

Vessels passing through Carimata strait and bound to Singapore during the months of December, January, and February, generally keep near the coast of Borneo (where the tides are said to be regular) to avoid the strong southerly current; and pass into the China sea through Greig channel.

Directions through Carimata Strait from the Northward.—Coming from the north-westward towards Carimata strait, if intending to pass outside or southward of Ontario reef, having brought Soruetou to bear N.E., distant 25 miles, steer S.E. by E., to give a berth to the Supposed rock westward of the Ontario reef. To keep to the westward of this Supposed rock, it would appear to be necessary to sink the west end of Soruetou from the deck of a large ship before it bears north of N.E. by N. Keep the west end of Soruetou to the eastward of N.N.E., until past Ontario reef, or 25 miles to the southward of Soruetou, or sink the west end of the island from the deck of a large ship bearing about N.N.E.; continuing the S.E. by E. course the Montaran islands will be seen, if the weather is favourable; pass to the eastward of them at 15 or 16 miles distance. From this position a S.S.E. course will lead in the fair track, between the Cirencester and Discovery shoals on the west side of the channel, and the Oliviera reef and Euphrosine rock on the east side. If not certain of the longitude, the best guide is to borrow towards the coast of Borneo, to get a sight of the land if circumstances admit, and taking a departure from Rendezvous island, steer to the southward between Oliviera reef and the Mankap shoals.

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The best track for vessels bound to the southward, particularly in cloudy weather, is to pass northward of Ontario reef, by keeping within 10 or 12 miles of Soruetou, until its west extreme bears N. ½ W.; then observing to keep it to the west of N. ½ W., in steering to the S.S.E., until the reef is passed. Proceeding to the southward, borrow towards the eastern side of the strait, where the soundings will generally be from 17 to 14 fathoms within from 30 to 20 miles of the coast of Borneo, deepening in some places as the shoals are approached on the west side of the strait, but not always affording a certain guide. To the southward of Rendezvous island the depths will increase from 19 to 21 fathoms irregular soundings, when about 30 or 33 miles to the south-westward of Pulo Mankap, which is as near as any large vessel should approach the shoals that extend far out from it in this direction.

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CHAPTER VIII.

OUTER ROUTE FROM BANKA STRAIT TO SINGAPORE.

VARIATION 1° 20′ EAST in 1878.

VESSELS bound from Banka strait to Singapore seldom adopt the Outer route to the eastward of the islands of Linga and Bintang, most vessels preferring to proceed by Rhio strait; it however forms part of the main route into the China sea, and is, therefore, of great importance.*

The COAST of SUMATRA from Batakarang point (page 213) trends about N.N.W. towards Tanjong Bon or Jaboeng in about lat. 0° 58′ S. The entire coast, which is very low, covered with wood, and entirely unknown, is fronted by a mud-bank, that may be approached to 6 or 5 fathoms water, except off Tanjong Bon, close to which there are in some places 9 fathoms, but all vessels should keep 3 miles from it. A bank of 4 fathoms was found by H.M.S. surveying vessel *Saracen* in 1861, with Tanjong Bon bearing N.W. by W., distant 9 miles; a depth of 6 fathoms also nearer the shore. This is probably a projecting horn or spit extending from the mud flat, and as shoaler soundings may be found, vessels bound to Varella strait should keep 5 miles off shore until Tanjong Bon bears West.

TOEDJOE or Seven Islands, lie in two groups, between the parallels 1° 16′ and 1° 5′ S., and the meridians 105° 14′ and 105° 20′ E. They are high and woody, visible at 25 or 26 miles, and surrounded by rocks and reefs. They are uninhabited, but occasionally visited by proas, for the purpose of obtaining wood and water; the water, which is bad and scarce, is procured on the west side of Pulo Toedjoe, where there are a few wells.

Pulo Joe, the southernmost of the islands, is very small, but rises to a height of 270 feet; a short distance north-east of it is a sunken rock. Pulo Lalang is an islet about a mile N. by E. from Pulo Joe; and a mile W.S.W. from it is another islet surrounded by a reef. Pulo Sato, the

* *See* Admiralty charts:—Banka strait to Singapore, No. 2,757; scale, $m = 0{\cdot}15$ of an inch: and Linga and Sinkep channels, No. 1,789; scale, $m = 0{\cdot}10$ of an inch.

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most western of the islands, is small, 105 feet high, and bears from Pulo Joe about N.W. by N., distant 4¼ miles. Pulo Meranti, also a small island surrounded by a reef, is 117 feet high, and lies between Lalang and Sato. Pulo Tjebia, the largest island of the southern group, is about a mile in extent, 373 feet high, and surrounded by a reef which projects a little more than a mile from its south-east extreme.

Pulo Toedjoe, the north-easternmost and largest of the Seven islands, is 3½ miles long N.W. ½ W. and S.E. ½ E., but only half a mile broad, and rises to several peaks, the highest of which is 526 feet above the level of the sea. It is surrounded by a reef, within the limits of which are some rocks above water, especially off its south-east end. About 2½ miles N.W. by W. ½ W. from its north-west extreme, is Pulo Toekonkembong, a small islet, 120 feet high, and surrounded by a reef. About 1½ miles W.N.W. from Pulo Toekonkembong, are the N.W. Rocks, the middle one of which is above water.

DOCAN ISLAND, 300 feet high, in lat. 0° 58′ S., long. 105° 39′ E., is about three-quarters of a mile in extent, surrounded by a reef, and a small islet with some rocks project nearly a mile from its north-eastern extreme. The summit of this island makes like a peak when seen from the northward, but round from the eastward.

Two reefs lie off the south point of Docan, the outer one of which (Mary rock), lying S.S.E. distant 2 miles from the point, was discovered in January 1823, by the ship *Mary* striking on it. There are 2 fathoms water over each of these dangers, and around them 14 to 18 fathoms.

The channel between the Toedjoe islands and Pulo Docan is 21 miles wide, and has regular soundings of 14 to 16 fathoms.

TOTY ISLAND or Pulo Laut, 250 feet high, in lat. 0° 54′ S., long. 105° 46′ E., is small, and surrounded by a reef. which on the east side projects half a mile. The summit of this island when seen from the northward appears round, but sharp from the eastward.

The passage between Toty and Docan is 6 miles wide, appears to be free from danger, and the depths in it are from 16 to 20 fathoms.

Directions.—When passing between Banka and the Toedjoe islands, the latter should not be approached to less than 10 fathoms water, nor Banka nearer than 5 miles, for its dangers are all about 4 miles in the offing, and nearly awash. Near the Malan Hyū and Malan Doyang rocks the bottom is rocky, and the depths irregular.

Vessels keeping to the southward of Toty and Docan islands, in order to cross over to Borneo, must take care to avoid Mary rock lying S.S.E. 2 miles from Docan island, and also Vega and other shoals, described at page 300.

Between the north coast of Banka and Toedjoe, Docan, and Toty

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islands, the general depths are from 14 to 17 fathoms, but more to the eastward they increase to 20 fathoms.

From October to March, during the north-west monsoon, the currents run with force to the south-east and during the other months to the north-west. It has, however, occurred that vessels going to Banka in June and July have experienced strong southerly currents. Along the north shore of Banka, in regular weather, there are generally two ebbs and two floods in the 24 hours.

PULO TAYA,* the centre of which is in lat. 0° 44′ S., long. 104° 54′ E., is of granite formation, covered with wood, and rises to a double peak 630 feet above the sea; the northern peak is about 60 feet less in elevation than the southern one, and both peaks when in line on a N. by E. and S. by W. bearing, show as a single triangular peak. Two sandy bays are formed in the bight between the hills, and there are two small islets off its north-east side. The whole shore of the island is steep, and may be approached to a distance of 3 cables. This island is uninhabited.

Water.—There is a spring of excellent water on the western side of Taya, and a boat at high tide can approach it to 40 feet, but at low tide rocks extend nearly a cable from the sand. The knowledge of this is important to the mariner, as no similar facility for watering occurs between Banka and Rhio strait. In the fine season boats come here from Linga seeking turtle.

CASTOR BANK, lying to the north-eastward of Pulo Taya, is a long ridge of coral and sand, nearly a mile wide, and 13 miles long in a N.N.E. direction. The general depths on it are 10 to 6 fathoms, but on one part, N.E. ½ N. 10 miles from Pulo Taya, there is a ridge about a mile in extent, and its eastern side steep-to, carrying only 5 fathoms. The bank is famous for a red species of fish, called from their colour Ikan Merah.

Pulo Taya bearing S.W. ½ W., will lead more than a mile eastward of the shoal parts of Castor bank, and bearing S.W. by S. the same distance to the westward. Diang or Eung, the east point of Linga (which, with a

* In old charts a shallow spot (Smith bank) of 2¾-fathoms, hard bottom, was shown at 22 or 23 miles southward from Taya island, and W. ½ N. from Toedjoe island, said to have been discovered by the English vessel *Thomas Harrison*, Captain E. Smith. The *Saracen* anchored on its supposed position, S. ¾ E. 20 miles from Pulo Taya, and sounded in every direction, 10 miles northward, 4 miles southward, and 5 miles eastward and westward. The soundings were regular, from 7 to 9 fathoms, mud bottom, and gave no indications of the existence of a bank.

The information relating to Smith bank, Pulo Taya, Castor bank, and Linga island, together with Frederick reef and the whole of the islands and dangers off the east coast of Bintang, has been derived principally from the result of the surveys by Mr. Stanton, Master commanding H.M. surveying vessel *Saracen*, in 1860–61.

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point to the westward of it, appears at a distance like two islands), bearing N.N.W., will lead about 4 miles north-eastward of Castor and also of Ilchester bank.*

ALANG KALEM or Ilchester Bank, in lat. 0° 24′ S., long. 104° 57′ E., on which the ship *Ilchester* struck, was examined by Captain D. Ross, I.N., who found it to extend N. by E. and S. by W. about 2½ miles, and 1½ miles in breadth, and to have but 6 feet water on its shoalest parts. Pulo Taya bore from the shoal S. ½ W., Pulo Maralie off the east point of Linga, N. by E., the east point of Linga N. ½ E., distant 8 or 9 miles. The depth of water decreases nearly all around from 18, 16, or 15 fathoms, suddenly to 5 and 3 fathoms on the edge of the shoal.

When passing this danger, Pulo Maralie must not be brought to the eastward of North, and Pulo Taya should be kept to the westward of S. by W.

SINKEP ISLAND, PULO PUNOEBO, and two islands to the westward, appear from a distance like one large island, being separated only by narrow channels. They lie off the south-western part of Linga, and, together with some adjoining islets and shoal spots, cover a space from 20 to 24 miles. Sinkep, the largest island of the group, is of very irregular shape, and of considerable elevation, having on its eastern side a range of hills with a peak 1,440 feet high near the centre of the range. It is only the east and north-east coasts of Sinkep and the dangers off it which will be noticed here; the other portions of the group belong to the Inner route, by Varella and Durian straits, and are described at page 375.

Dangers.—At 3¾ miles E. by S. ¼ S. from the south-east point of Sinkep, is the south end of a shoal, which from thence extends N.N.E. for 5 miles, but is only about 1½ miles broad. At the south end of the shoal is a patch of 2¼ fathoms, and another of 2¾ fathoms at the north end; between these patches are depths of 4½ and 5 fathoms. Cape Boekoe (the south point of Sinkep) bearing West leads a mile southward of this danger; and the eastern point of the island bearing North leads about the same distance eastward.

Rocks and shoal water extend nearly a mile from the east point of Sinkep, and the *Saracen's* soundings show a bank projecting 5 miles in a north-easterly direction from it, on the extremity of which there are but 4 fathoms water. As no soundings have been taken near the north-east coast of Sinkep, it should be approached with caution. There are some

* Cowman bank, said to lie 6½ miles N.E. by N. of the Castor, was searched for in vain by the *Saracen*.

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rocks awash off the east sides of the small islets lying between the north-east point of Sinkep and Punoebo.

LINGA ISLAND, lying about midway between Banka and Singapore straits, is about 33 miles in extent, in a W.N.W. and E.S.E. direction, but excepting at the southern part where the town and road are situated, the island is very little known and has never been surveyed. Upon its southern part is a remarkable mountain, the peak of which, rising to an elevation of 3,920 feet, is split in two, forming a sort of double peak, which Horsburgh describes as "two peaks rising like spires from the summit of the mountain," but which is more generally thought to resemble asses' ears, visible many miles in all directions. Viewed from the sea this mountain presents a most beautiful and imposing appearance, which is sure to arrest the attention even of the most careless observer.

The north-eastern coast of the island is formed of numerous hillocks, from 200 to 300 feet high, which give it a uniform appearance; the contour of the coast line is, however, very imperfectly known.

The east extreme of Linga, named by the natives Tanjong Eung, from its prominent position and pyramidal peak, 750 feet high, is conspicuous, and visible in clear weather 30 miles off. Tanjong Roe may be known by a saddle hill, 630 feet high, near it. The southern coast of Linga, between these points and between Tanjong Roe and the town of Linga, being all low land, both points make like islands when above 13 miles distant.

Pulo Meralie is an islet lying three-quarters of a mile off shore, in a S.E. by E. direction from the hill on Eung point. Pulo Kaka, a larger islet lying about half a mile off shore in a South direction from the same hill, is surrounded by a reef which off its south-west point extends a mile. Between Eung point and Tanjong Roe the coast recedes, and forms a deep bight named Tolo bay, on the east side of entrance to which is a small islet with some rocks awash around about it. Pulo Singsa, a small islet, lying a little more than a mile to the southward of Tanjong Roe, is surrounded by a reef, and a rock awash lies half a mile off its south end; soundings of 4 and 5 fathoms extend about a mile southward and south-westward of it.

LINGA ROAD and TOWN.—The bay forming Linga road is exposed to southerly and easterly winds, and large vessels are obliged to lie far out on account of shoal water extending from the mouth of the river around Pulo Colombo and its adjoining islets. Pulo Colombo, the largest of these islets, lies S. by E. ¼ E. nearly 2 miles from the entrance of the river. Anto and Ballang islets are both small, the former lying about a mile S.E., and the latter the same distance E. by S. from Colombo. W. by S. 2¼ miles from Colombo is another small islet named Pulo Badas,

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which is almost connected by reefs to Pulo Mapar, a larger islet about a mile to the northward, with a grove of cocoa-nut trees on it; the village here contains about 300 Malays and Chinese, chiefly fishermen.

The following are the outermost of the dangers extending from the islets:—A shoal with only 2 feet water over it lies with Pulo Badas and Pulo Mapar in one N. by W. ¼ W., and the south point of Pulo Colombo N.E. by E. ¼ E. Another shoal extends 2 miles S.S.E. from Pulo Anto, having 1½ fathoms water on its extreme; Ponoebo peak, bearing W. ¼ N., leads over the tail of this shoal, and bearing W. ½ N. leads half a mile southward of it and nearly a mile southward of the 2-feet shoal off Pulo Badas.

H.M.S. *Saracen* anchored in Linga road in 4 fathoms, mud, Pulo Badas bearing N.N.E. half a mile, Sinkep peak, 1,440 feet high, S.S.W., and Ponoebo peak, 955 feet high, W. ½ S. Horsburgh says that the safest anchorage for strangers is 3 or 4 miles off shore, with Pulo Taya S.S.E. ½ E., and the south point of Linga East-southerly. Linga peak just to the eastward of Colombo, N.W. ½ W. or N.W. ¾ W., with Ponoebo peak bearing about W. ¼ S., and the peak of Sinkep S.W. by W., appear also to be good anchoring marks.

The town of Linga, called by the natives Dyak, is prettily situated on the banks, and nearly a mile within the entrance of the fresh water river marked on the chart. The high, rugged, fantastic peak of Linga in the background, together with the rakish appearance of the country prahus, all moored to cocoa-nut trees and areca palms, their rich foilage almost obscuring the houses, give to the whole a picturesque appearance. The river is not more than 100 feet wide, and will only admit small vessels, as its bar dries at low water springs. Both sides near the entrance are densely wooded, and alligators are numerous.

The town is said to contain (in 1860) about 4,000 Malays and 1,500 Chinese. The former prefer their usual style of houses constructed on poles, but some of the Chinese have substantial buildings of stone. The produce is rattans, pepper, and gambier, which is carried to Singapore and Rhio by country vessels and prahus. Gold is found in small quantities after heavy rains. Tin has not yet been found, but the neighbouring island of Sinkep produces some. There are no Europeans on the island. The Sultan is nominally under Dutch protection, and the resident of Rhio pays him an annual visit.

Water.—The *Saracen* obtained good water, but with difficulty, from a well in the interior of Pulo Mapar. It was at first procured from a well near the village, but the natives, from religious scruples, objected to its use. The shore is bordered by a reef, which makes watering difficult except from half flood to half ebb.

Tides.—It is high water, full and change, in Linga road at 7 p.m.,

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and the rise is 7 feet. The flood runs at the rate of 2 knots to the westward.

Directions.—A vessel proceeding towards Linga road from Banka strait, should pass westward of Pulo Taya, and steer for the high land to the eastward of Linga peak, giving the eastern coast of Sinkep a berth of at least 5 or 6 miles. In working, by not bringing the east point of Sinkep to the eastward of North, will avoid the shoal off the east side of that island; and by not bringing the south-east point of the island to the southward of S.W. until Linga peak bears N.N.W. ½ W., will avoid the shoal bank which extends 5 miles in a north-easterly direction from the east point of Sinkep. When standing towards the south coast of Linga care must be taken to avoid the De Hes rock, with 6 feet water over it, which lies with the south extreme of Pulo Singsa bearing E. ¾ N., distant 4 miles; Linga peak N.W. by W. ½ W.; Sinkep peak W. by S. ½ S.; and the nearest points of Linga bearing respectively N.E. by N.-northerly distant 2 miles, and N.N.W.-westerly distant 2¼ miles; close to the rock are 12 or 14 fathoms. The right extreme of Pulo Kaka just open of the right extreme of Pulo Singsa, bearing about E.N.E., leads a mile to the south-east of the De Hes rock, and Linga peak N.W. by W. leads to the south-west.

Bound to Linga road from the north-eastward, round the east point of Linga island at a moderate distance, and then steer to the westward for the anchorage.

The NORTH-EAST COAST of LINGA is formed of numerous hillocks, from 200 to 300 feet high, which give it a uniform appearance; but neither it nor the adjacent islets are safe to approach at night, being as yet but imperfectly surveyed. The soundings obtained by the *Saracen* in this locality, were confined to those above a depth of 10 fathoms, as vessels can gain no advantage by keeping close in shore.

EAST DOMINO or Selentang, is an islet lying about 8 miles northward of Tanjong Eung, the east point of Linga. Horsburgh says that this islet is 80 feet high, and that rocks awash project from it to the southward, to the distance of 2½ miles; but the Dutch chart only shows a reef extending about a mile north and south of the islet, and a smaller islet close to the westward of it; a rock awash is placed about 2½ miles south of it. The soundings close to the eastward of the islet are 14 fathoms, increasing to 16 and 17 fathoms at the distance of 3 or 4 miles.

DOMINO HILL, or Boediang Island, is about 2 miles in extent, and a peaked hill near its centre bears W. by S. ¼ S. 4 miles from the East Domino.

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GREAT DOMINO or Kongka Island is larger than Domino hill, from which it bears N.W. ¼ N. 3½ miles. It is said to be moderately elevated, and the chart shows a peaked hill on its western side. Off its south-east point are two islets named Maras, and off its north-west point are two others, named Saroes or Blaiding.

BRISBANE SHOAL, on which the English barque *Brisbane* struck in 1876, lies N.W. by W. ½ W. 2½ miles from Crocodile rock; it is composed of coarse gray sand, about one mile in extent north-west and south-east, with 2 fathoms water, and 6 to 7 fathoms close around. There are depths of 6 to 8 fathoms between this shoal and Crocodile rock.

A CORAL REEF awash at low water, lies about 2 miles W. by S. from Crocodile rock, it is about three quarters of a mile long N.N.W. and S.S.E. and 70 yards broad; between this reef and Great Domino island, there is a channel 3 miles wide with 7 to 11 fathoms water.

CROCODILE ROCK, about 15 feet above water, and visible 5 miles off, lies N.E. ¾ N. 4 miles off a conspicuous conical hill on the north-east part of Great Domino, and its position is about lat. 0° 1′ N., long. 104° 54½′ E.*

Domino hill, if not brought to the eastward of South, will lead well clear of this danger.

KINTAR ISLAND.—Three other islands with one or two adjacent islets extend from 4½ to 8 miles in a north-westerly direction from the Great Domino. The large island next northward of Great Domino, named Kintar, has on its southern end a fine bluff, and when coming from the northward, before the adjacent islands to the southward are visible, it much resembles the hill on the east end of Linga.†

A rock lies N.W. by W. ½ W., distant 2 miles from Pulo Kapas, which is a small islet surrounded by a reef, and the north-westernmost of the group extending from Kintar.

FLY BANK, the position of which is doubtful, is a small patch of 2 fathoms, said to lie N.N.W. ¾ W. 10½ miles from Crocodile rock, with the high bluff of Kintar bearing South, a little westerly, distant 7¾ miles, and Pulo Kapas W.S.W. 5½ miles; close to it are depths of 9 to 13 fathoms.

POLLUX ROCK lies N.W. about 4 miles from Fly bank, with the high bluff of Kintar bearing S. by E. ¼ E. 11 miles, and Pulo Kapas S.S.W. 5½ miles; close to it are depths of 10 and 11 fathoms.

RODONG PEAK.—North-westward of Linga island are many small islands. The most conspicuous of them is Pulo Rodong, or

* Mr. W. Stanton, Master R.N. † Lieutenant C. J. Bullock, R.N.

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Merodong, which has a high conical peak, 724 feet above the sea, the only hill of this feature in the vicinity. This peak is one of the principal objects which will enable a stranger to make out the entrance to Rhio strait; it may, however, occasionally be useful to vessels working to or from Singapore by the Outer route.

SAND BANK.—At 16 miles S.S.E. from Pulo Gin, is the southern part of a bank having 7 and 9 fathoms water. It is 17 miles in length, N.N.E. and S.S.W., with its eastern side steep-to, and at its northern end Pulo Ruig bears N.N.W. ¼ W., which bearing clears also the Geldria and Frederick reefs. In the N.E. monsoon much rain and thick weather are experienced, and this bank is a good guide to clear these reefs, and will save anchoring in deep water.

FREDERICK REEF, in lat. 0° 37½′ N., long. 105° 10½′ E., is awash at low water springs. It consists of two rocks about a cable apart, near the middle of a coral bank 3 cables in length north and south, and nearly 2 cables in breadth, having 20 to 22 fathoms all around, except at the north-east side, where irregular soundings from 10 to 13 fathoms extend half a mile from it. From the centre of the reef Pulo Ruig, or Ragged island, bears N.W. ⅔ N. 22 miles, and Pulo Borean W.N.W. 21⅔ miles.

In the vicinity of this reef in light winds the discolouration of the water is the only guide, and in fresh breezes it is difficult to distinguish breakers from the swell. Breakers on the reef can only be distinguished when the tide is setting against the wind with a comparatively smooth sea. Off Bintang island at the change of the monsoon in April, the flood tide runs for 18 hours, and the ebb 6 hours. In June the tides are reversed, consequently a tide against the wind will only take place a few hours each day.

As this most dangerous reef lies in the direct track of vessels, the utmost care is necessary to avoid it. A vessel will clear it to the eastward by not going into less than 25 fathoms, and to the westward by keeping Gin peak (a conspicuous hill, 337 feet high), Gunong Kwas (857 feet high on Bintang), and Pulo Borean well in sight, until the latter bears W. by N. The high peak of Linga island S.S.W. ½ W., or Pulo Ruig bearing from N.N.W. to N.W. by N., will also lead clear.

From a close examination by Mr. Stanton in H.M.S. *Saracen*, soundings having been taken in every direction to the extent of 7 miles eastward, and from 4 miles southward of the reef to the Geldria bank, he was led to believe that the other reefs which were said to exist near are identical with it, and that the Frederick reef is the only danger in this vicinity.

EAST COAST of PULO BINTANG.—Numerous islands and dangers lie off the southern part of the east coast of Bintang, among which no vessel should venture. Vessels making passages between Banka

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and Singapore straits should pass outside or to the eastward of the whole of these islands and dangers, and it is therefore only necessary here to notice the outermost of them. The whole coast and the islands of it are, as a rule, fringed with coral.

PULO GIN or Great Island, about 4 or 5 miles in extent, lies about 3 miles south-eastward of the south-east extreme of Bintang. Although appearing as but one island, it is really made up of three small islands separated from each other by narrow channels, which together form the largest island off this part of Bintang. There are several hills on it from 200 to 300 feet high, and one, named Gin peak, rising about the centre of the south-eastern portion of the island, is 337 feet high.

PULO TEROBI, the most southern of a cluster of small islets lying to the eastward of Pulo Gin, is 112 feet high, and bears E. by S. $2\frac{1}{3}$ miles from the south-east extreme of Gin.

PULO BOREAN or Saddle Island, is one of the outer islands lying 3 or 4 miles to the eastward of Pulo Gin, inside the Geldria banks, and bears from Pulo Terobi, N. by E. $\frac{3}{4}$ E. 5 miles. Being saddle-shaped, it is conspicuous and easily recognized.

PULO RUIG or Ragged Island, appropriately named from the irregular appearance of the trees on its summit, is the outer and easternmost island off the east coast of Bintang. It is about the same size and height, 315 feet, as Pulo Borean, and is steep-to at 3 cables off.

GELDRIA BANK is the outermost of a dangerous group of shoals lying 13 or 14 miles eastward of Pulo Gin, well out in the fairway of vessels proceeding between Banka and Singapore straits, especially such as pass inside Frederick reef. Its north extreme is in lat. 0° 48′ N., long. 104° 58′ E., from which it extends S.W. by S. about 2 miles, having 2 to 4 fathoms water over it, 19 to 20 fathoms nearly close to the eastern side, and 8 to 12 fathoms, irregular depths, near the south-west and west sides.

RALEIGH SHOAL lies W. by S. $\frac{1}{4}$ S. 3 miles from the south-eastern extreme of the Geldria. It has only 2 fathoms water over a coral bottom, from which Pulo Borean bears W. by N. $\frac{1}{2}$ N. 5 miles, and Pulo Ruig N. by E. 11 miles.

A SHOAL PATCH, of coral and sand, nearly a mile in length and half a mile in breadth, with 2 fathoms water, lies S.W. by W. $\frac{1}{2}$ W. nearly 6 miles from the south extreme of the Geldria, with the centre of Pulo Borean bearing N.W. $\frac{1}{2}$ N., distant $4\frac{1}{2}$ miles.

There is a small knoll with 2 fathoms and several with 4 fathoms water between this patch and the Geldria, of which they are considered

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to be a continuation; they should be avoided by vessels of heavy draught.

Directions. — Pulo Terobi, the southern islet off Pulo Gin, bearing W. ¼ S., clears the southern extreme of the above shoals; and the Boat rocks in line with Pulo Borean W. by S. ¾ S., or Pulo Ruig N.N.W. ¼ W., clears the northern extreme. No good near marks can be given to clear the eastern side, which is steep-to, but the high peak of Linga bearing S.S.W. ½ W., is a broad and distant clearing mark, and leads over the large sand bank, having 7 to 10 fathoms, south-eastward of Pulo Gin.

BOAT ROCKS, lying about 2½ miles N.W. ½ N. from the north end of the Geldria bank are three low rocks, visible about 4 miles from a vessel's deck.

A rocky patch, with 3 fathoms water over it, lies between the northern extreme of the Geldria bank and the Boat rocks, the latter bearing N.W. by W., distant one mile.

A CORAL BANK, with 3 to 5 fathoms over it, and about one mile in extent, lies W.S.W., 5¼ miles from Pulo Ruig. Pulo Borean, or Saddle island, bearing S.S.W., clears its eastern side.

PULO PANJANG, which in the Malay language signifies Long island, lies about 9 miles off the east coast of Pulo Bintang. It is a large irregular-shaped island, the south side about 2 miles in extent, the north side about 4 miles, and its greatest length in a N.W. and S.E. direction is 5 miles. Rocks extend a mile off its north-east point; and there are others, some above and others below water, off its south-east point, the outer ones of which, named the Bare rocks, are 55 feet high.

On the north-east side of the island the coral reef,—which as a rule fringes all the islands contiguous to the east coast of Bintang, as well as that coast itself,—is absent, leaving a small sandy bay, where vessels may anchor in 8 or 9 fathoms, about three-quarters of a mile off shore. As the bottom in parts of this bay is foul, great care must be taken to keep the two Bare rocks open of Tree islet 50 feet high with a single tree on it, forming the southern extreme of the bay.

Wood and Water may be procured in this bay, and boats can approach close to the beach at all hours of the tide.

PASSAGE ROCK, 26 feet high, lies about three-quarters of a mile to the northward of the north-east point of Panjang.

PULO SUTO, MIDDLE ROCK, BLACK ROCK, and PULO BLANHAP, lying north and north-west of Pulo Panjang, form a sort of chain stretching from outside the dangers off the north coast of that island to the shore of Bintang, and to the southward

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of which no vessel—except under extraordinary circumstances—should attempt to pass.

Pulo Suto, or Volcanic island, 140 feet high, lies N.W. by N. 2 miles from the north-east point of Pulo Panjang. It is steep-to on the north side, but a reef extends half a mile from its south extreme.

Middle rock is a dangerous pinnacle, awash at low water, lying N. by W. $\frac{3}{4}$ W. $2\frac{1}{2}$ miles from the north point of Pulo Panjang, W. by N. $\frac{3}{4}$ N., nearly 4 miles from Pulo Suto, and S.E. by E. $\frac{3}{4}$ E. $2\frac{3}{4}$ miles from Black rock. Close to the rock are depths of 11 fathoms, with 14 to 16 fathoms a mile or two distant from it. It may be avoided by not bringing Black rock to the northward of W. by N., or by keeping without the direct line between Pulo Suto and Black rock.

Black rock, 22 feet above water, with a smaller rock close to its south side, lies N.W. by W. $\frac{2}{3}$ W. $2\frac{3}{4}$ miles from Middle rock, and nearly 5 miles N.W. $\frac{1}{4}$ N. from the north-west point of Pulo Panjang. Near the rock the soundings appear to be irregular, 13 to 17 fathoms, and it may be approached to a distance of 2 cables.

Pulo Blanhap is a small island 90 feet high, lying E. by N. $\frac{3}{4}$ N. nearly 2 miles from Tanjong Blanhap, on the north-east coast of Bintang.

NORTH-EAST COAST of PULO BINTANG.—From Tanjong Blanhap to Tanjong Brakit, 8 miles to the N.N.W. $\frac{1}{4}$ W., the north-east coast of Bintang forms a bay about 2 miles deep, indented with several small bights or coves. Over a point about a mile north-west of Tanjong Blanhap is a conspicuous tree, the top of which is 252 feet above the sea; 2 miles W.N.W. of the tree is a hill, 420 feet high. Three-quarters of a mile northward of this hill, close to the coast line on the deepest part of the large bay, is another, named Double Tree hill, 334 feet high.

The shore of this part of Bintang is for the most part fronted by a reef which projects in some places to the distance of half a mile, and just to the northward of the point, upon which stands a conspicuous tree, is an extensive bed of rocks, between which and the point north-westward of it is Boat cove. Boat cove appears to be a convenient place for a boat to land.

Water.—Two or three small streams of fresh water appear to discharge themselves near the middle of this bay, but the watering place is marked on the chart a short distance to the northward of Boat cove.

Soundings.—From Black rock, which is steep-to, to Pulo Coco, a small island lying close to the eastern face of Tanjong Brakit, and which may be approached to half a mile, the soundings shoal gradually, and the lead is a good guide (page 124).

Tides.—It is high water, full and change, at Horsburgh lighthouse, Singapore strait, at 10 h. 10 m. p.m.; at Tanjong Brakit, the north-east

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point of Bintang, at 11 h. 0 m.; at Pulo Suto at 3 h. 40 m.; at Pulo Panjang at 4 h. 20 m.; at Pulo Borean at 6 h. 0 m.; and at Pulo Terobi at 1 h. 0 m. p.m.; the rise is 9 feet, but on extraordinary occasions it is 12 feet.

During the shifting months of the monsoons the tidal streams are regular, but during their strength the surface current will be always more or less governed by the wind.

The flood tidal wave comes from the northward, and runs nearly parallel to the east coast of Bintang, along its southern side towards Abang strait, and to the northward in Rhio strait, meeting another tide from Singapore strait near the town of Rhio.

The flood sets to the southward along the east coast of Linga, and close to Tanjong Eung, its south-eastern extreme; from thence it runs West to Ponoebo strait and obliquely across Linga bay to Varella strait. From Tanjong Eung to Pulo Taya, and onwards to Banka strait, its direction is nearly South; another stream from about 2 miles south of Taya sets towards Varella strait.

The ebb stream sets in the opposite direction, and the meeting of this stream from Banka and Varella strait was observed to take place near the supposed position of Smith bank (page 330).

Winds.—During the shifting months of the south-east monsoon sailing vessels are often five and six weeks in making the passage from Singapore to Banka strait. In the month of September the *Saracen* had the south-east monsoon strong, with much rain; about the equinox there were several heavy squalls. This monsoon is generally supposed to shift about the beginning of October, but during the whole of this month the wind was only 4 hours from the northward, there being a succession of calms, light southerly airs, a close muggy atmosphere surcharged with electricity, and frequent heavy Sumatra squalls or south-westers. On the 9th of November the monsoon shifted with furious gusts.

These squalls at this season generally take place at night, accompanied with heavy rain, thunder, and lightning. They are of short duration, and it was noticed that when one occurs about the time of full and change, another may be expected an hour later every night till the next change of moon.

Directions by the Outer Route from Banka Strait to Singapore.—The ordinary route for sailing vessels bound northward from Banka strait is between the Toejoe islands and Pulo Taya; they may, however, pass on either side of Pulo Taya, which, being high and bold, is very convenient to make in thick weather or at night.

At night, or in thick weather, the lead will be very useful in detecting the drift caused by cross currents between the Toejoe islands and Sumatra,

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for the depth decreases generally towards Sumatra, and increases towards those islands; but care should be taken in approaching them, as the remarkable irregularities of the currents have brought many vessels into the danger of being entangled among them. Near Sumatra a mud bottom mixed with sand prevails, and near the islands mud only.

The Castor bank, lying to the north-east of Pulo Taya, carries not less than 5 fathoms water, but a vessel will pass eastward of it by not bringing Pulo Taya south of S.W. ½ W., and westward of it by keeping that island south of S.S.W. ½ W. The east point of Linga (which, with a point to the westward of it, appears at a distance like two islands) bearing N.N.W. will lead from 4 to 5 miles to the north-east both of the Castor bank and the Ilchester shoal. But in order to avoid the last-named danger, if the channel between the Castor bank and Linga is used, take care not to bring the east point of Linga to the east of North.

Having passed eastward of Pulo Taya, a course may be steered to cross the equator in 20 or 21 fathoms, or in long. 105° 30′ E. From the equator steer about North until past the Frederick and Geldria shoals, observing in the night not to come under 23 or 24 fathoms between lat. 0° 30′ and 0° 50′ N. to avoid those dangers; if it be day when Pulo Ruig or Ragged island is seen, keep it westward of N.W., and it will lead eastward of these shoals. When abreast of Pulo Panjang, and in soundings of 24 or 25 fathoms water, a N.W. or N.W. by W. course, according to tide, will lead to the entrance of Singapore strait. (*See* Chapter II.)

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CHAPTER IX.

RHIO STRAIT.

VARIATION 1° 25′ East in 1878.

GENERAL DESCRIPTION.—The route from Banka Strait to Singapore, outside Linga and through Rhio strait, is the one now commonly adopted by vessels proceeding either way between Sunda strait and Singapore, for the reasons stated at page 153, that Rhio strait is safe, sheltered, and easily navigable, the Dutch Government having placed beacons on many of the dangers; whereas the route outside Bintang is exposed in both monsoons, and the fairway is encumbered with many rocks and shoals, which render it necessary for vessels to keep at a long distance from the land.*

This route is particularly convenient for sailing vessels leaving Singapore for Europe in the north-east monsoon, and but few now adopt any other. By proceeding through Rhio strait, they avoid the delay and inconvenience so frequently experienced during that season in getting to sea by the main channel of Singapore strait, past Horsburgh lighthouse. In the south-west monsoon also, vessels are frequently able to proceed to the southward much quicker by this route than by the outer one.

Owing to the similarity in the appearance of the coasts in Rhio strait it is somewhat difficult for a stranger to recognise the different points and islands. Mr. Stanton, commanding H.M.S. *Saracen*, in passing through the strait in 1861, made some observations to assist in recognizing the land, the results of which are embodied in the following description.

Rhio strait, the southern limit of which is between Missana and Talang islands, is bounded on the east by Bintang island, and on the west by the chain of islands of which Battam, Rempang, and Galang are the chief; numerous smaller islands and shoals front the main shores on each side of the strait, and very much contract the width of its main navigable channel. The general direction of the strait is N.W. and S.E., extending from about lat. 0° 26′ to 1° 12′ N., and having soundings from 5 to 40 fathoms.

* *See* Admiralty Charts: Banka strait to Singapore, No. 2,757, scale $m = 0{\cdot}15$ of an inch; Singapore strait, No. 2,403, scale $m = 0{\cdot}66$ of an inch; and Rhio Strait, No. 2,418, scale $m = 0{\cdot}65$ of an inch.

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The southern entrance of the strait is about 15 miles wide, for a distance of 11 or 12 miles; it then suddenly narrows, so that in advancing 3 or 4 miles to the north-westward, between Garras and Topie islands, it is only 3½ miles wide. About the middle of the strait is Pankel island, surrounded by a reef extending in some places half a mile off shore, to the westward of which is the principal channel, about 2¼ miles wide, bounded on the west by the islets and banks off the north-east end of Galang. The passage eastward of Pankel is obstructed by several reefs and islets, which render its navigation intricate.

To the northward of Pankel, the strait suddenly widens to 8 or 9 miles between Sembolang point (the eastern extreme of Rempang island), and Rhio island on the Bintang shore, the depth here varying from 5 to 12 fathoms. The widening of the strait is caused by the deep bight in the Bintang shore, in which are Dompa, Rhio, Sengarang, and Oedjang islands, close to the mainland, and farther out Penjingat, Terkolei, and Loban islands, at the north-western extreme of the bight, where the strait again narrows to 2½ miles between that island and the islands and banks to the westward. Northward of West point (the western extreme of Bintang), the strait rapidly widens to its northern entrance, where it is about 10 miles wide.

WEST SIDE OF THE STRAIT.

MISSANA ISLAND is peculiar in shape, consisting of two narrow ranges of moderately elevated hills, which lying in different directions form an elbow on the north-west part of the island; the longer range extends from the south point of the island 4¼ miles in a N. by W. ½ W. direction, whence the shorter extends E. by S., 2 miles.

The shore reef extends only a short distance from the north-eastern part of Missana, but from the north shore it projects about half a mile, and a 2-fathom patch lies some distance outside the edge of the reef, which makes it dangerous to approach that shore nearer than one mile. A cluster of rocks above water lies 2 or 3 cables westward of the north-west point of the island, westward and south-westward of which other dangers extend more than half a mile.

Niamok, a small square-shaped island, with a reef projecting nearly 1¼ miles in a north-easterly direction, from its north-east side, lies 1¼ miles south-eastward of the south point of Missana, and between them is a rocky islet, and several dangers which block the channel.

Anchorage.—A small, thickly wooded islet lies a quarter of a mile south-eastward of the east point of Missana, forming with the eastern side of that island and Niamok, a bay which appears to afford good anchorage; but it must be entered with caution, to avoid the reef which extends in a

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north-easterly direction from Niamok, also the reef which projects in places nearly three-quarters of a mile from the shore of Missana, and embraces the small islet off the east point. Vessels may, however, find convenient anchorage in the bay, in from 5½ to 8 fathoms, by not bringing the eastern part of the small islet to the eastward of N.E. by E., and the eastern side of Niamok to the eastward of S. by E. ¼ E.; the south point of Missana bearing W. by S. leads clear of the reef which projects from Niamok.

RODONG PEAK, 797 feet high, bears S.W. by W. 4½ miles from the north-west point of Missana. This peak seen from the southward presents a conical appearance, and being the only hill of this feature in the vicinity is conspicuous. It is one of the principal objects which will enable a stranger to identify the entrance to Rhio strait, for it can nearly at all times be seen over Missana as the strait is approached. The hill, from the peak, forms a shoulder to the north-westward, and then gradually slopes in that irection, so that after Missana is passed the conical shape disappears.

BINAN ISLAND, lying W.N.W. 3¼ miles from Missana, is 2¼ miles long, narrow at both ends, and widening to half a mile near the middle of the island, which there forms a rounded point to the north-east; the island is easily recognized by a conspicuous hill, 269 feet high, at the south-east end. A reef fronts the greater part of Binan, extending a quarter of a mile off the north part, and more than double that distance off the north-west extreme.

Rifleman Shoal, situated about a mile off the centre of Binan, is a patch of hard sand three cables in extent, the least water upon it being 12 feet, and from this spot the hill on Binan island bears S.W., and the north-west extreme W. by N.

KATANG LINGA ISLAND lies 1¼ miles N.W. by W. from Binan; it is a bold, bluff-looking island, 246 feet high, nearly a mile long and half a mile broad; a shore reef fronts the greater part of it, extending off in some places nearly 1½ cables. A shoal, having about 4 feet water over it, lies three-quarters of a mile W.S.W. from the north point of Katang Linga, but it is quite out of the way of vessels navigating Rhio strait.

Binan and Katang Linga, limit in the direction of the strait, a large number of islands, named the Tetampan group (*see* page 382.)

SELANGA ISLANDS, three in number, are small, but elevated and conspicuous; they lie to the north-westward of the Tetampan group, the northern one bearing from the north end of Katang Linga W. by S., distant 3 miles. Vessels working should not stand to the southward of a line drawn between Katang Linga and the North Selanga, which will keep

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them clear of the shoal W.S.W. of the first-named island, and of a reef, having a rock with a tree upon it, which lies between the Tetampan group and Selanga islands.

OEDIK is a small island lying N.W. by W. ¼ W., 3½ miles from the north Selanga, and E. by N. from the north end of the long island of Pangallap. This island and Selanga islands lie out of the track of steam vessels; or of sailing vessels proceeding through Rhio strait with a fair wind, but when working through vessels should not stand to the southward of a line drawn between the north Selanga and Oedik, in order to avoid a rock awash which lies W. ½ N., 1¾ miles from the former island.

PULO RONDO or Dumpo, 129 feet high, lies N.W. ½ W. 7½ miles from Katang Linga, and about 1½ miles to the south-east of the south end of Galang island. It is a remarkable little island, showing very round and bold against the adjacent land, and is one of the most useful objects for recognizing the entrance to the strait when coming from the southward. Haai reef, a patch of 2 fathoms, lies a quarter of a mile to the southward of it; and there is a rock above water, about 3 cables distant to the north-westward.

GREAT BANK.—Pulo Galang terminates to the southward in a long narrow point, projecting in a S.S.E. ½ E. direction, and half a mile to the eastward are three small islands lying in a line parallel to it; between the point and outer island is a coral patch with 12 feet water, and 7 to 9 fathoms close around. Between these islands and Selatan island, about 3 miles north-eastward of them, is a deep bay fronted by a bank, named by the Dutch, Groote or Great bank. This bank has 2¼ to 3 fathoms over it, 3½ to 5 fathoms between it and the small islands, and 4 to 8 fathoms between it and Selatan. The anchorage in the bay inside the bank was formerly considered to be good, but large reefs and shoals extend, both from Galang and Selatan, which render it anything but a safe and convenient place for large vessels seeking a temporary anchorage.

EAST BANK lies N.N.E. ¾ E. 4¾ miles, from Pulo Rondo, its outer or northern part being a third of a mile S.E. ½ E. of Dempo point, the eastern point of the adjacent islands. It is little more than half a mile in extent, with three-quarters to 1½ fathoms water, and 10 to 12 fathoms near it.

TJASSENS SHOAL lying between Pulo Tarong (the island close to the northward of Selatan) and the southern part of Great Garras island, is about 3½ miles long in a N.W. by W. ¼ W., and S.E. by E. ¼ E. direction, and one mile broad with 4 to 18 feet water on it; the south-east extreme of the shoal which is nearly in the line between Dempo point and

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the east end of Great Garras, terminates in a reef which dries at half-tide. There is a channel on each side of Tjassens shoal, but the northern one is very narrow at the western end, having a general depth of 3½ fathoms, and is only available for small vessels; the southern channel is nowhere less than three-quarters of a mile wide, with depths of 6 to 13 fathoms. Care is necessary, however, when avoiding Tjassens shoal, to give a safe berth to a small patch of reef which lies a third of a mile off the north-east part of Pulo Tarong, and when the west end of Great Garras bears N.E. borrow on that island shore in order to avoid the bank extending from the east side of Pulo Galang, and upon which are some patches of reef; the northernmost of these patches has a small islet upon it, and lies N.W. a little over a mile from the west end of Great Garras.

LITTLE GARRAS ISLAND marks the entrance of the narrow part of Rhio strait; it is but a quarter of a mile long east and west, formed of two small hills, and encompassed by narrow fringe of reef.

Dittlof Reef, which lies about three-quarters of a mile S. by E. from the eastern extreme of Little Garras, has a 3-fathom patch about a quarter of a mile South of it, 4½ to 10 fathoms close to; and between it and Little Garras island there is a patch with 2 to 3 fathoms.

LIGHT.—On the eastern hill of Little Garras stands a lighthouse, painted white, from which is exhibited a *fixed* white light, elevated 118 feet above the sea, and visible 8 miles. This light is very useful for guiding vessels into the narrow part of the strait by night, and leading them between Pankel and the Moeboet islands, and northward until Pulo Sau light comes in sight.

GREAT GARRAS ISLAND, situated half a mile westward of Little Garras, is 3¼ miles long W. by N. and E. by S. three-quarters of a mile broad, has a flat summit, and terminates with abrupt points. A reef encircles it and extends in places a quarter of a mile off. A patch of reef lies about a third of a mile from the north-west point of the island; from this point and extending nearly half way along the north coast of the island, is a bank, with but 12 to 18 feet water over it, projecting nearly a mile from the shore, and for half a mile farther in the same direction the soundings are under 5 fathoms; large vessels should not, therefore, stand inside a line drawn between Little Garras, and East Moeboet islands.

TARONG POINT, the north-east extreme of Galang island, bears N.N.W. ¾ W. 2½ miles from the west end of Great Garras; and has on its northern side a small bay, in which there is a native village. A reef fronts the point to a distance of a quarter of a mile, outside of which a shoal bank rounds away to the small islet opposite Great Garras.

MOEBOET ISLANDS.—At 6 miles N.W. ½ N. from Little Garras, is the larger and higher of the two Moeboet islands, easily

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distinguished by its prominent position, and the deep inlets to the westward and southward. It rises to a round peak, with the greatest declivity on the eastern side; whilst the smaller island, or West Moeboet, is considerably lower towards its centre. Dangerous reefs and shoals extend from these islands nearly 1½ miles to the southward; the west end of Great Garras bearing S. by W. leads to the eastward of them, and the extreme of Tarong point in line with the extreme of a point a mile westward of it bearing W. by N. ¾ N., leads to the southward. Shoals also extend more than a mile north-westward of East Moeboet; the north and east extremes of Sembolang point in line bearing about N.W. is a close mark for clearing the eastern side, and the south end of Pankel, bearing E. by S. ¾ S., leads to the northward of them.

The inlet between Pulo Galang and Pulo Rempang is blocked by a sand-bank having general depths of 6 to 12 feet over it; there are also some dangerous reefs a third to three-quarters of a mile to the northward of Tarong point; between these dangers and the Moeboet shoals there is a clear channel, nearly half a mile wide, with 4½ to 9 fathoms.

SEMBOLANG POINT, the eastern extreme of Rempang island, is the next prominent object on the western side of the main channel after passing northward of the Moeboet islands. It is fronted by a reef, close to which are 5 to 9 fathoms. From this point the land trends to the westward, increasing the width of the strait.

TIEMARA BANK, lying N.W. ¾ N. 3¼ miles from Sembolang point, and about 1¼ miles eastward of Tiemara island, is about half a mile in extent, with 1¼ fathoms water over it, and 7 to 9 fathoms near it. A black buoy with a white band is moored on the eastern side of this bank, in 3 fathoms, with N.E. point of Tiemara island bearing N.W. by W.; and east point of Pulo Loban N.N.E. To avoid the bank, Sembolang point should not be brought east of S.E. by S., nor the eastern extreme of Tiemara Ketchil northward of N.W.

Vessels of heavy draft should not bring Sembolang point to the eastward of S.S.E. until Tiemara bank is passed.

In the bay between Sembolang point and Tiemara island, the soundings are regular, decreasing from 9 and 10 to 6, 5, and 4 fathoms, as far as Tiemara bank, but S.S.W. ½ W. from this last, and a quarter of a mile outside the shore reef fronting Pulo Rempang, lies a small detached reef from which the east extreme of Tiemara bears N. by W. ¾ W. A short distance to the westward a spit projects from the shore reef in the direction of Tiemara bank more than half a mile; and from the south-east part of Tiemara island a shoal bank extends in the direction of the spit, leaving but a narrow channel between them.

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TIEMARA ISLAND, the southernmost of the chain of islands which front Salat Bulang between Pulo Battam and Pulo Rempang, is 341 feet high, about 1½ miles long, N.E. ¼ N. and S.W. ¼ S., three quarters of a mile broad, and surrounded at a short distance by reef: Tiemara island when first seen appears like a bold point projecting from Rempang. Between it and the Tiemara bank the depths are 3¼ to 7 fathoms. A shallow mud bank, having patches of sand (uncovered at high water) upon it, nearly fills the large bay, south-westward of Tiemara island, and, extending outside the shore reef fronting Pulo Abu, approaches the eastern extreme of Pulo Kantyil in a northerly direction; off the east end of Abu some rocks lie just inside the edge of the bank. There is a narrow channel between this bank and the Tiemara islands, but it is available for boats only.

TIEMARA KETCHIL, lying about a mile N. by W. ½ W. from the north-east point of Tiemara island, is about a third of a mile in extent, and surrounded by reef which on the east side of the island projects a quarter of a mile; near this reef there are 12 to 21 fathoms.

Between the Tiemara islands are several reefs, which render the channel unnavigable.

PULO KANTYIL, AYER RADYA, and ANTU ISLANDS.—The eastern extreme of Kantyil, a long and somewhat narrow point, is a quarter of a mile west of Tiemara Ketchil; Ayer Radya lies close to the north-westward of Kantyil, and is the northernmost of four islands lying between Tiemara island and Bulang strait. Antu is a small round island with an islet off its north-east point, lying close to the north-east shore of Ayer Radya. A reef surrounds both the island and the islet, to the distance of a third of a mile.

Johannes Shoal.—On the edge of the bank, with 2½ to 3 fathoms over it, which fills up the bay between the eastern extreme of Pulo Kantyil and Antu, lies Johannes shoal, a small 2-fathom patch with 7 fathoms close to outside. A line from the east end of Tiemara Ketchil to the islet off Antu passes just outside the shoal, so that vessels should not bring that extreme of Tiemara Ketchil to the eastward of S.S.E. ¾ E., which will keep them clear both of the Johannes shoal, and the reef extending from Antu: Sembolang point kept open of Tiemara Ketchil will likewise clear both dangers.

Innang Reef is a small reef lying at the entrance of Salat Bulang nearly three-quarters of a mile from the south-east side of Pulo Innang, limiting this part of Rhio strait to the westward. This reef bears from Tiemara Ketchil N.N.W. ¼ W. distant nearly 3 miles; and from Pulo Loban Ketchil, which limits the opposite side of the strait, W. by N. 2½ miles. A white buoy with a black band, lies in 5¼ fathoms, on the eastern point

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of Innang reef, with south point of Pulo Loban bearing E. by S. ¼ S., Sau lighthouse N. ½ W., and south point of Pulo Innang W. ½ S. There are depths of 6 and 7 fathoms close to Innang reef, and a small bank of 4¾ fathoms to the southward and south-westward of it. Sau lighthouse, not brought to bear northward of N. by W. ½ W., will keep a vessel clear of Innang reef and the tongue of rocks and sand extending from Sau.

PULO INNANG, situated 1½ miles north of Ayer Rayda, is about 2½ miles long, N.E. ½ N. and S.W. ½ S., and 1½ miles broad; the southern part of this island forms the northern side of the entrance to Bulang strait. A reef fronts Pulo Innang to the distance of a third of a mile, and its outer part, abreast the north-east shore of the island, should not be approached too close; this part was formerly marked by a beacon, which bore from Innang reef N. by E. 1½ miles, and which will probably be replaced by the Dutch Government.

PULO SAU is larger than Innang, and lies to the northward of it, the channel between them being about a cable wide. Inside these two islands are several islands with channels between leading into Pulo Bulang. A detached rocky patch lies S.S.E., a quarter of a mile from the eastern point of Sau, from which a tongue of rocks and sand extends about 1½ miles in a southerly direction, the extreme of this tongue bears E. by S. ¼ S., distant half a mile from the north point of Innang.

LIGHT.—A lighthouse painted white stands on the east point of Sau island, and exhibits at an elevation of 118 feet, a *fixed* white light, visible in clear weather from a distance of 8 miles.

PULO INNANG KETCHIL and VAN GOGH'S SHOAL.—Innang Ketchil is a small island lying on the north-east part of the reef which surrounds Pulo Sau, opposite Bintang, West point, from which it is distant 2 miles.

A shoal with 2 to 2½ fathoms water on it extends about half a mile N.N.W. from Innang Ketchil, and another shoal, half a mile in extent, with 2¾ fathoms over it, lies a quarter of a mile further off in the same direction. Van Gogh's islet, (surrounded by a reef which extends south-westward from it nearly half a mile,) lies N.W. by W. ½ W. from the east point of Innang Ketchil. About half a mile N.N.W. of this islet is a dangerous coral shore, with less than 6 feet water over it, the northern edge of which has 3 fathoms, and bears N. by W., 2 miles from the north point of Pulo Sau. The east point of Sau in line with the east point of Innang Ketchil leads eastward of all these dangers, and Malang Yarong, (an islet, on the opposite coast,) bearing E. ¾ S. leads to the northward. The soundings decrease rather quickly under a depth of 10 fathoms near the dangers just described, and in the event of a vessel standing towards

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the southernmost of them getting a cast of 10 fathoms or less, she should tack immediately.

MALANG ORANG REEF.—The north-east coast of Battam, from abreast Pulo Sau to Nongsa or Boerang point, (which forms the western point of the north entrance to Rhio strait,) is fronted by reef, extending in some places to the distance of three-quarters of a mile. The Malang Orang reef lies nearly three-quarters of a mile from the Battam shore, and about E.S.E. from Tanjong Malang Orang; it is nearly half a mile in extent north and south, with 5 to 8 fathoms near it. A black buoy with a white band is moored near the eastern edge of this reef, in 9 fathoms, with Pan reef beacon bearing N.E. $\frac{3}{4}$ E.

PAN REEF, lying nearly in the middle of the northern entrance of Rhio strait, is visible at low water, when it appears as a long ridge of black stones; the reef is half a mile long, N.E. $\frac{3}{4}$ N. and S.W. $\frac{3}{4}$ S., and 2 cables broad, with 5 to 7 fathoms close to, except at the S.W. end, where it is not so steep. A large screw pile beacon is placed near the north-east end of this reef, and near the south-west end, lies a black buoy with a white band, in 8 fathoms, with Sau lighthouse bearing S. $\frac{1}{4}$ E.; and Pan reef beacon N.N.E.; the other edges are sometimes marked by small basket beacons, but they are not to be depended upon. There is a safe passage on either side of Pan reef; that on the west side, between the reef and Battam shore, although not so wide as the eastern, between the reef and Bintang, the depths of water in it, (6 to 10 fathoms,) are more convenient for anchoring in case of meeting with light baffling winds and contrary tides; the native pilots seldom use the eastern channel, where the depths are much greater.

Seamen will find no difficulty in proceeding for the first time by either channel, aided by the chart. The soundings in the eastern channel are too irregular to admit of any useful description here, but the screw pile beacon on the reef will always point out the position of that danger in time to give it a proper berth, even if the buoy moored off the south end should get adrift.

Barbukit hill, on the Malay peninsula (*see* page 126), bearing N. $\frac{1}{4}$ W. leads eastward, and Johore hill bearing about N. by W. $\frac{1}{2}$ W. leads westward of Pan reef; but Sau lighthouse in line with the east extreme of Innang Ketchil, bearing S. $\frac{1}{2}$ E., is a good leading mark for passing between Pan and Little Pan reefs; Sau lighthouse bearing S. $\frac{3}{4}$ W. leads to the eastward of Pan reef; and when Tanjong Nongsa, the northern extreme of Battam, bears W. by N., or when Pulo Nongsa just opens of Tanjong Nongsa, a vessel will be to the northward of it, and has entered Singapore strait.

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Pas-op or Little Pan Reef, lying N.W. ½ W., 2½ miles from Pan reef, is a small oval-shaped coral patch, with depths of 3½ to 7 fathoms close around it: a black buoy with a white band is moored in 3 fathoms near the northern extremity of this reef, with Pan reef beacon bearing S.E. by E., and Tanjong Boerong W. by N.; it is only necessary to give the buoy a moderate berth on passing. Pulo Nongsa (*see* page 121) open of Tanjong Nongsa, leads clear to the northward; and Sau point open of the land southward of Tanjong Malang Orang, leads close to the eastward of Little Pan reef.

EAST SIDE OF THE STRAIT.

PULO TALANG, or Long Island, the south-west point of which forms the south-eastern limit of Rhio strait, is irregularly shaped, nearly 5 miles long, north-east and south-west, and about a mile broad. It may be known by a square hillock over its south-east end, 350 feet high, which, with a sharper peak westward of it, forms a saddle; the land from this to the western end of the island is nearly of the same elevation. A small islet lies to the eastward of the square hillock a quarter of a mile off shore, and three-quarters of a mile to the northward of the latter is a white rock.

Talang is surrounded by a reef which extends nearly half a mile from some parts of the island, but does not project far from its south-west end. The soundings off the south-west part of the island are 8 to 13 fathoms, but on the east side, a mile from the islet and white rock, there is a long narrow strip of bank with 3¾ to 5 fathoms water over it, 7 to 12 fathoms outside, and similar depths inside; north of white rock there are but 3 fathoms on this bank, and some detached reefs lie between it and the shore reef.

PULO GIN, or Great Island (*see* page 337) lies 2 miles to the eastward of the northern part of Talang, and forms one of the objects which mark the entrance of Rhio strait.

HENDRIK JAN ROCK, on which a Dutch ship of that name struck in February 1861, is a dangerous pinnacle said to be nearly awash at low water, and steep-to, having 9 and 10 fathoms close around it. It lies S.E. three-quarters of a mile from the south-eastern point of Talang, with the summit of South-west hill just shut in by the south-western extreme of Talang. This rock is of small size, and there was great difficulty in finding it.* Several other shoal patches were found in the channel between Talang and Gin; but they all, except the Hendrik Jan, lie out of the ordinary track of ships, and are dangerous only in the event of this channel being mistaken in thick weather for the entrance of Rhio.

* Mr. W. Stanton, Master R.N.

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Vessels should give these islands a berth of 2 miles in passing, and not bring Pulo Terobi eastward of E. by N., until South-west hill comes well open of Talang.

In the position assigned to Hendrik Jan rock, not less than 12 feet could be found by Mr. T. H. Tizard, Master, when surveying Rhio strait in H.M. schooner *Saracen*, 1866.

PULO SIOLON, or Mantang Island, 7 miles long E. by N. and W. by S. and 2½ miles broad, lies to the north-westward of Talang, and is separated from it by a channel about 1¼ miles wide. On its south-west end is South-west hill, 267 feet high, which, when seen from the southward, appears as a double-peaked hill, terminating to the westward in a point which forms the south-west extreme of the island; but when viewed from the northward, it makes with a peaked top.

At 4½ miles eastward of South-west hill is Siolon hill, which has a flat table summit, and is remarkable from its being the highest hill on Siolon. It rises abruptly from the northward to an elevation of 507 feet, and terminates to the southward in a bluff point, close to which is Segai islet, which is lower than the adjacent land, Pulo Siolon has a narrow channel running through it, at 4¼ miles to the eastward of South-west hill.

At a distance of 12 miles to the southward, both Siolon and South-west hills, owing to the land between them being low, appear as islands.*

The south shore of Pulo Siolon, between South-west and Siolon hills, forms a bay about a mile deep, and is fronted by a fringe of reef and a shoal bank extending out in places nearly three-quarters of a mile; upon this bank lie two or three detached patches of reef. Thomas shoal, a patch 4 cables in extent, with 2 to 3 fathoms water over it, lies W.S.W. from Segai islet, distant nearly a mile.

There is good anchorage under the southern shore of Siolon, between Thomas shoal and South-west hill, in 10 to 6 fathoms, with shelter from northerly winds; but large vessels should not stand inside the line between the south point of Segai and South-west hill, or to a less depth than 5 fathoms, as the soundings are irregular and shallow.

Siolon Channels.—There are channels on either side of Siolon which will lead out into the China sea, northward of Pulo Gin; but as they are quite out of the ordinary track of vessels, they should not be attempted by any one not locally acquainted. The southern channel, between Siolon and Talang, is about 1¼ miles wide, and has depths varying from 14 to 24 fathoms in mid-channel, and from 5 to 9 fathoms near the shore on either side. Some reefs lie at the eastern end of the channel, which render the passage through it somewhat intricate.

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The northern channel, between the north shore of Siolon and the coast of Bintang, has several islands and reefs lying along and extending off more than a mile from the Siolon shore. The outer or western of these reefs and islands are named Alligator and Blading reefs, and vessels should not pass eastward of a line drawn from them to Alligator island. Two reefs lie on the northern side of the channel, the outermost of which, Prins reef, is one mile distant from Tanjong Batu Babia. The entrance to the channel is between this reef and Blading island, and is $1\frac{3}{4}$ miles wide, with depths of $3\frac{3}{4}$ and $4\frac{1}{2}$ fathoms. Inside to the eastward of the two reefs and Tanjong Batu Litjing, the shore of Bintang is free from danger, and vessels may anchor at any convenient distance from it, in 12 to 8 fathoms. At the eastern end of the channel are several islands and reefs, which render it, like the channel southward of Siolon, somewhat intricate.

The tides in the Siolon channels run with great strength, and there are numerous overfalls.

ALLIGATOR ISLAND, three quarters of a mile long N. by E. and S. by W., and a quarter of a mile broad, lies $1\frac{1}{2}$ miles W.N.W. from the western end of Siolon : seen from the westward, it shows as three round lumps, but when approached from the northward, it appears to slope gradually from its northern end, which is 101 feet high.

A detached reef lies about a quarter of a mile N.N.W. from the south-west point of Siolon. There is also a rocky patch, nearly awash, about a quarter of a mile N.E. from the north point of Alligator island ; and another patch, having $1\frac{1}{4}$ fathoms over it, about a third of a mile to the eastward of the south point. There is no passage between Alligator island and Siolon.

Alligator Reef, lying nearly a mile north of Alligator island, is a quarter of a mile in extent ; a white buoy with black band is moored on the north-west edge of this reef in 4 fathoms, with west point of Alligator island bearing S. $\frac{1}{2}$ E., Topie island (south point) W. $\frac{1}{2}$ S., and Blading island N. by E.

BLADING ISLAND, lying $1\frac{1}{4}$ miles to the northward of Alligator reef, is small and surrounded by a reef which extends in a southerly direction more than a quarter of a mile.

Eastward of Alligator reef and Blading island are several other reefs and islands, lying off the northern shore of Siolon.

Prins Reef, 2 miles N. by W. from Blading, is about a third of a mile in extent, and forms with that island the western entrance of the channel between Siolon and the coast of Bintang. It lies on the outer edge of the shoal bank which fronts Tanjong Batu Babia, and the shore of Pulo Dompa, and is the outer of the two reefs before mentioned as lying off the

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Bintang shore; the other, which is about the same size, bearing E.S.E. from it, distant nearly a mile; from this last, a shoal bank, with $1\frac{1}{2}$ to 3 fathoms water over it, extends nearly a mile in an easterly direction.

The Topies are a cluster of small round islets and rocks lying about 2 miles westward of Alligator reef. Topie in the Malay language, signifies hat, and when approached from the southward these islets, as they rise above the horizon, present very much the appearance of the round, inverted basin-shaped topies, or hats, in use among the Malays. The northern and eastern islands are the largest of the group, the former is 134 feet and the latter 118 feet high. When approaching the eastern island from the northward, it appears of a crown shape, and in clear weather may be seen 10 miles off.

A rock lies close off the north-east end of the eastern island; and a bank half a mile long, with $2\frac{3}{4}$ fathoms water over it, lies with its outer edge bearing S.E. by S., distant three quarters of a mile, from the same island.

Rotterdam Reef is a rocky patch with only $1\frac{1}{2}$ fathoms water over it, lying W. by S. $\frac{1}{2}$ S. a little more than half a mile from the northern of the Topies group. A white buoy with black band is moored on the west side of the reef, in $2\frac{3}{4}$ fathoms, with the south point of Pulo Pankel bearing N.W. by W. $\frac{1}{3}$ W., and Topie island (centre) E. by N. $\frac{1}{4}$ N.

There is another reef, with but little water over it, lying N. by W. $\frac{1}{2}$ W., nearly half a mile from the same island, its northern end is marked by a beacon. Near these dangers are 6 and 4 fathoms.

Soundings.—In the channel between the Topies, and Alligator island and reef, (which forms a part of the inner route to Rhio,) the depths are 5 to 8 fathoms, the deepest water being on the eastern side of the channel; close to the westward of the south part of Alligator island there is a hole with depths of 16 to 23 fathoms. In the channel between the Topies and Garras island, which is the main passage through the strait, the soundings are irregular, $5\frac{1}{2}$ to 7 fathoms being the general depths near the former; a long narrow bank with 4 or 5 fathoms water on it, extends about $2\frac{1}{2}$ miles in a southerly direction from the northern Topie; to the westward of this bank the depths increase from 6 to 9 fathoms until within half a mile of Dittlof reef and Little Garras, where there is a hole of 21 and 22 fathoms.

Dutch Shoal, a quarter of a mile in extent with 3 fathoms water over it, and 6 or 7 fathoms close to its western side, lies on the eastern side of the main channel between the Topies and Pulo Pankel, with Little Garras lighthouse bearing S. $\frac{3}{4}$ W., $3\frac{1}{4}$ miles; the northern island of the Topies group E. by S. $\frac{3}{4}$ S., $3\frac{1}{2}$ miles; and the south-west extreme of Pankel N.W. $\frac{1}{4}$ W. $1\frac{1}{3}$ miles. The northern Topie bearing E. by S. $\frac{1}{2}$ S.

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and the south-west extreme of Pankel N.W. ½ N., will lead a quarter of a mile south-west of this danger.

Dutch Shoal is situated on the western edge of a bank having 3 to 5 fathoms water, which lies about a mile off the south-east end of Pankel; this bank is about 5 miles long N.W. by N. and S.E. by S., and about 1½ miles broad: a good mark to keep clear of the entire western edge is the apex of Pulo Loban in line with the western extreme of Pankel. Between the bank and Pankel the depths are 6 to 10 fathoms.

PULO PANKEL, 2 miles long north and south, and half a mile broad, bounds the eastern side of the main channel of Rhio strait, abreast of Great Garras and Moeboet islands; it is surrounded by a reef which extends from a quarter to half a mile from the shore. Outside the reef at the north-west part of the island, a bank with less than 3 fathoms water over it, projects to a distance of three-quarters of a mile. Eastward of this bank, and half a mile northward of the north point of the island, lies Pankel reef, a patch of rocks about a quarter of a mile in diameter. Pulo Pankel at a distance makes as two distinct round hills; on a nearer approach a sandy beach will be seen at its south end, from which rocks and fishing stakes extend nearly three-quarters of a mile.*

Rupels Reef, lying about a mile to the eastward of Pankel, has a beacon on the northern part, from which the north extreme of Pankel bears N.W., nearly 1½ miles. From the south extreme of the reef, the south-east end of Pankel bears S.W. by W. ½ W. distant 1½ miles.

A black buoy with white band is moored on the east side of Rupels reef, in 5 fathoms, with Soré island (east point) bearing N. by E., Pulo Pankel (N.W. point) N.W. ⅓ W.

SORE ISLAND and REEFS.—Soré island lying E. by N. ¾ N. nearly 1½ miles from the north end of Pankel, is a small, round island, covered with cocoa-nut trees, and surrounded by a reef, from which a bank with 2 to 5 fathoms water extends about 1½ miles in a S.S.E. direction. From the island the shore reef extends more than half a mile N.N.W., and half a mile farther in the same direction lies a detached reef, nearly a third of a mile in diameter; in the channel between are 5 to 8 fathoms. Nearly a mile N.W. ¾ N. from this detached reef lies the south-east end of the largest of the Soré reefs; it is a narrow strip of sand and coral a little more than a mile and a quarter long in a N.W. ½ W. and S.E. ½ E. direction, nearly surrounded by a small bank with 2 or 3 fathoms water on it and 7 to 9 fathoms close to; in the channel between this and the reef to the south-eastward there are depths of 4 and 5 fathoms.

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A white buoy with black band is moored near the noath-west end of Soré reefs, in 2½ fathoms, with Pulo Pitjingit bearing E. by N. ½ N., and Terkolei lighthouse N. by W. ¾ W.

The channel, limited on one side by Rupels reef, Pulo Pankel and Pankel reef, and on the other by Soré island with the reefs and banks adjacent to it, is free from danger, with depths of 9 to 14 fathoms.

PULO DOMPA, irregularly shaped, 4 miles long east and west, and 1¾ miles broad, is separated from the west coast of Bintang by a narrow channel only available for boats. Its western extreme, Tanjong Dompa. bears N.E. by E. 2 miles from Soré, and N. by W. 6 miles from the northern island of the Topies.

Two small islands lie off the south shore of Dompa, the western of which is Basing, and the eastern Pulo Sekatap. Both of these, as also Dompa itself, are bordered by reefs which extend from a quarter to a third of a mile from the shore. A beacon marks the outer edge of the reef extending from Tanjong Dompa.

A bank, with 4½ feet least water, and 2 and 3 fathoms on other parts, extends from the south-western shore of Dompa. Its outer edge lies nearly three quarters of a mile S. by W. ¼ W. from Tanjong Dompa, and half a mile N.W. by W. ½ W. from the west point of Basing island; near it are 7 and 8 fathoms, and a short distance off 16 or 18 fathoms. The shore bank fronting the southern part of Dompa extends from a detached patch of reef a short distance eastward of Basing island, to Prins reef, its outer edge in 3 fathoms being about half a mile outside Sekatap. A patch of 2 fathoms lies S.E. ½ S. three-quarters of a mile from Basing and another of 3 fathoms about a mile in the same direction from that island.

The channel between the edge of the bank (extending from the south-west side of Dompa) and Soré is about a mile wide, and is generally used by vessels bound to Rhio from the southward; the depths in it vary from 8 to 19 fathoms.

RHIO ISLAND is about 4½ miles in length east and west, and 2¼ miles wide, and being separated from the mainland of Bintang by a very narrow channel, appears to form part of it. The town, which stands on the north-west points of the island, was formerly a port of much trade; and although its importance has for many years declined, is still a place of considerable traffic for small vessels. There is a well-built fort on a hill commanding the town.

Anchorage.—The usual anchorage is in 3 or 4 fathoms, about 2 miles northward of the west end of Dompa, sheltered from the northward by Pulo Pitjingat. The soundings decrease gradually to 4 and 3½ fathoms, but shoal suddenly under a depth of 3 fathoms.

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Tides.—It is high water, full and change, at Rhio, at 9h. 50m.; springs rise 7 feet, neaps 5 feet.

PAKKO is a small islet lying about half a mile off the western shore of Rhio island in the middle of a rocky bank about half a mile in extent. There is a narrow channel between the rocky bank and the western shore of Rhio, having 1½ to 2 fathoms water in it, and which is marked on the western, or rocky bank side, by three beacons.

PULO PITJINGAT, or Mars Island, lies half a mile westward of the north-west point of Rhio, opposite the town. The island is about a mile long east and west, a third of a mile broad, and surrounded by a reef which projects from its southern and western sides about a quarter of a mile.

PULO SENGARANG is nearly twice the size of Rhio, lying to the northward, and separated from it by a channel a half to three-quarters of a mile broad. The western extreme of this island projects some 3 miles to the north-westward of Rhio, forming a roadstead or anchorage between it and Pitjingat. Vessels anchoring here—which most of the small native vessels do, on account of being much closer to the town of Rhio—usually enter by the narrow channel between the Pakko reef and the west shore of Rhio, for the entrance to the roadstead from the westward is barred by a shoal with 4 to 6 feet water over it. There is a large Chinese village on the southern part of Sengarang, opposite to the town of Rhio.

Loz, or Loos, is a small island lying close to the west end of Sengarang, inside the margin of the reef which extends from that island.

TERKOLEI ISLAND, which lies W.N.W. 4 miles from Pitjingit, is situated near the middle of a dangerous shoal bank; the island is low, flat, about half a mile in extent, with a clump of trees on its east end, and surrounded by a reef which extends nearly half a mile to the eastward, a quarter of a mile to the westward, and a quarter of a mile to the southward from it; this shoal bank composed of hard sand and mud, is 8 miles long in an E.S.E. and W.N.W. direction, the eastern part of which extends to within half a mile of the reef surrounding Pitjingit: a 6-feet patch lies E. by S. ¾ S., 8 cables from the east end of Terkolei, and for a distance of 2½ miles in an E. by S. direction from it there are but 12 feet water; the 3-fathom edge of the bank is three-quarters of a mile southward of the 6-feet patch; between this position and the west end of Pitjingit the bank trends E. by S., nearly 2 miles. It was on this bank that the ship *Minerva* grounded in 1825, with Terkolei bearing N.W. ½ N.* The western part of the bank (named Irene shoal in the

* Horsburgh, Vol. II. p. 54.

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Dutch charts) extends in a W.N.W. direction from Terkolei to within a quarter of a mile of the reef projecting from the east end of Loban, having but 3 to 6 feet water over the greater part of it.

A black buoy with white band is moored in 2½ fathoms on the southern edge of this shoal bank, with Pitjingit bearing E. by S. and Terkolei lighthouse N.N.W.

The south extreme of Pitjingit bearing East clears the south-east tail, and the apex of Pulo Loban bearing N.W. by W. ¾ W. will lead clear to the southward of Terkolei and the western part of the bank.

Between the eastern part of the bank and Pulo Udjang the depths are under 3 fathoms; but a run of much deeper water extends from abreast of the west end of that island, (between the western part of the bank and shore flat,) northward of Loban into the main channel of the Strait.

Light.—On the west end of Terkolei stands a white lighthouse, from which is exhibited at an elevation of 31 feet, a fixed white light, visible in clear weather from a distance of 6 miles.

Isabella Shoal situated three-quarters of a mile southward of Loban, is nearly three-quarters of a mile long east and west, 2 cables broad, and has from one to 2¾ fathoms water over it, the one-fathom patch being near the centre of the shoal. A tail with 3½ to 4½ fathoms water stretches from its eastern extreme nearly a mile in an E.S.E. direction. The eastern end of this shoal is marked by a white buoy with black band, moored in 3 fathoms, with east point of Pulo Loban bearing N.N.E. ½ E., Terkolei lighthouse East, and south point of Loban Ketchil N.W., and the western by a black buoy with white band, in 3 fathoms, E. ¾ S., 3 cables from the west buoy. The depths at a short distance from the south side of this danger are 6 to 10 fathoms, but its western edge is steep, there being 14 fathoms close to. Terkolei lighthouse bearing E. ½ N. leads to the southward, and Sau lighthouse in one with the west end of Loban Ketchil leads well clear to the westward of the shoal.

LOBAN ISLANDS, lying about half a mile off the south-west part of Bintang, form a group of four or five small islands, separated by channels so narrow that they appear as one island. These islands may be recognized by the gradual rise the largest island takes from its north end, to a round hummock in the centre, which with Loban Ketchil, (the islet off its west end,) appear when approaching them from the westward as three distinct hills.*

A reef surrounds the group, and extends to the distance of a quarter of a mile from the north-west, and a third of a mile from the south-east end of the islands, but not farther than 2 cables from the north-west end of Loban

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Ketchil. A small detached patch lies a third of a mile south of the south-west point of Pulo Loban. The depths close to the reef fronting the western side of the Loban group are 11 to 20 fathoms.

A 2-fathom patch lies outside the shore reef on the north-west part of Loban, the western edge of which bears N.N.E. ¼ E. three-quarters of a mile from the small islet off the west end of Loban Ketchil.

DESSA ISLET and REEFS.—Dessa, situated on the southern side of a shoal three-quarters of a mile in extent, is a small islet, conspicuous from having only one tree upon it bearing N. ½ W. 2 miles from the west end of Loban Ketchil, and S. by W. ½ W. about half a mile from Tanjong Batu, the nearest point of Bintang. Two patches of reef, together nearly a mile long E.S.E. and N.N.W., lie with their western extreme about a third of a mile southward of Dessa, and between these and the 2-fathom patch off Loban, there is a channel nearly half a mile broad with 3½ to 9 fathoms water. A rocky patch lies off the north-west side of Dessa, at the distance of one third of a mile. Close to these dangers the soundings are 12 to 23 fathoms. Loban Ketchil bearing S.S.E. or Bintang West point not brought westward of N. ¼ W., will lead to the westward of all these shoals.

Tanjong Batu is 2¼ miles northward of Loban Ketchil, the pitch of the point being about half a mile north-east of the reef lying off the north-west side of Dessa. At Tanjong Batu the land recedes abruptly to the eastward.

PULO DUA, about three-quarters of a mile long, N.N.W. and S.S.E., fronts the bay between Batu and West points, and with the exception of a round lump which rises in its centre is lower than the adjacent land; there is a remarkable white rock near its west side. The island is bordered by a reef, and a small detached patch lies nearly a quarter of a mile south-westward of its south point, and a rock awash about the same distance to the south-eastward. This rock contracts the channel between the island and shore to 1½ cables, in this part there are 7 to 12 fathoms; thence the depths vary from 4½ to 11 fathoms, and 3 cables northward of the reef fringing the north part of Dua, and 2 cables from the Bintang shore, is a 3-fathom patch, with moderate depths around.

WEST POINT, bearing N. by W. ¼ W. 3 miles from Tanjong Batu is moderately elevated land, presenting a round shelving appearance, and from it the coast line trends to the north-eastward, forming the eastern side of the north entrance of Rhio strait; the point is bold-to on the south and west parts, but on the north part a reef commences to extend from the shore, and trends in a northerly direction passing outside of Senggera rocks.

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The Senggera are a ledge of flat rocks, lying a quarter of a mile off shore. The outer rock is about 1½ miles N. ¼ E. from West point. Rocks (part of the shore reef and covered at high water,) extend a short distance outside the group, and at low water, detached rocks will be seen nearly as far as West point.

MALANG YARONG is a small islet, covered with trees, lying half a mile North from Senggera rocks, on the edge of the reef fronting the shore, which here extends more than a third of a mile off.

PULO KERA, or SKERRIE, is a small island lying N.E. ¼ N. 2 miles from Malang Yarong and close off Tanjong Kalumpong; it is of an oblong form, about 80 feet high, and will be recognized by the cosat near it receding to the E.N.E., in the direction of the Subong river.

The reef which fronts the coast from West point, follows the trendings of the coast, and passes a quarter of a mile outside Kera, thence to the eastward, fronting the southern coast of the large bight between Kera and Tanjong Subong.

A Bank, with 1½ to 3 fathoms, and one spot having less than a fathom water over it, fronts the shore reef above mentioned; the 3-fathom line which marks its edge, trends from Malang Yarong in a N.N.E. direction for about a mile, thence a point more to the eastward, and passes about half a mile outside Pulo Kera; from which it trends with an irregular outline to Tanjong Subong, passing just outside the Pap and a group of rocks E.N.E. from it. This bank between Malang Yarong and Kera is steep-to, and must be carefully avoided.

Netscher Shoal, the outer part of which lies half a mile outside the shoal bank just described, has from 9 to 18 feet water with less than a fathom water on its north-west extreme. It is a somewhat circular shaped shoal, about half a mile in extent, composed of hard sand and coral, and from the outer edge Pulo Kera bears S. by W. distant 1½ miles, and the extreme of Tanjong Subong N.E. by E. ½ E., 4¼ miles. Close to the western side of this danger are 10 and 6 fathoms, and the lead cannot be depended upon to give warning in time to avoid it.

SUBONG BAY, the deep bight between Pulo Kera and Tanjong Subong, is nearly filled up with reefs which extend 2¼ miles from the shore in the south-east part of the bay; there are also several outlying rocks above water. The outer of these, Outer rock, is about 10 feet high; it lies E.N.E. 1¼ miles from Netscher shoal, and N.E. ½ N. 2⅓ miles from Pulo Kera. The Pap, a rock which dries 6 feet at low water, lies three-quarters of a mile southward of it, just inside the 3-fathom line of the shore bank. A single rock, about 6 feet above high water, lies E. by S. half a mile from Outer rock; and at one mile E.S.E. from Outer rock, is a small group, the

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largest and highest of which presents a square appearance; this group, like the Pap, is just inside the 3-fathom edge of the shore bank. At 1¼ miles N.E. ½ N. from the group just described, the 3-fathom line projects to the north-westward, forming between it and Square rock a small bay a third of a mile deep, where there is safe anchorage in 4 fathoms; between this projection of the bank and the islet off Tanjong Subong, the 3-fathom edge recedes somewhat, and forms another small bay.

The depths between Netscher shoal, the Pap, and Outer rock are from 3½ to 5 fathoms; and between Outer rock, Crocodile shoal, and Tanjong Subong 3½ to 7 fathoms.

Crocodile Shoal is a small patch of hard sand with 3 fathoms water over it, and is the outermost of the dangers off this part of Bintang. It lies N.E. ¼ N. 2⅛ miles from Netscher shoal; N.N.E. ¾ E. 3¾ miles from Pulo Kera; and W. ½ S. 2¼ miles from Tanjong Subong. Close to the west and north-west sides of this shoal are 6 to 8 fathoms, and 4½ fathoms a quarter of a mile from it on the north-east side.

Pulo Kera bearing S.S.W., leads nearly half a mile westward of the Crocodile; and Pulo Nongsa bearing West, or the islet off Tonjong Subong E. ½ S., leads half a mile to the northward. Barbukit hill N. by W. ¼ W. will also lead to the westward.

Sau lighthouse bearing S.S.W. ½ W., clears the shoal bank N.N.E. of Malang Yarong, as also the Netscher and Crocodile shoals: Sau lighthouse is a good guide for strangers when working near this rather dangerous coast.

TANJONG SUBONG is the north-west extreme of Bintang and the north-eastern limit of Rhio strait. It bears from Pulo Kera N.E. ½ E., 5¼ miles, the coast between forming Subong bay, at the head of which is the entrance of Subong river. A small islet lies off the pitch of the point, and S.W. by W. a third of a mile from this islet is a sunken rock. Some islets also lie close to the coast S.S.E. from Tanjong Subong.

Soundings.—The Soundings in Rhio strait are too irregular to give any useful description of them, but they will be readily understood by reference to the chart. It may, however, be observed that in the track through the strait, 20 fathoms will be obtained at half a mile from the Garras islands, and about 15 fathoms at the distance of a mile, decreasing quickly to 9, 8, and 7 fathoms farther to the eastward. Abreast of Moeboet island there are 15 to 12 fathoms, and abreast of Sembolang point 10 to 6 or 5 fathoms, increasing to 12, 15, and 18 fathoms as Tiemara island is approached. From Tiemara to the Loban islands the soundings will deepen to 20 or 23 fathoms, with perhaps occasional casts of 17 or 18 fathoms, and thence through the remainder of the strait similar deep

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irregular soundings will be obtained, with casts now and then of 13 or even 10 fathoms.

Tides.—The flood tidal wave in the China sea comes from the northward and, being divided by the island of Bintang, sweeps round its shores and flows into Rhio strait at both ends, the stream from Singapore strait meeting that from the southward in the space between Tiemara island and Rhio. The main body of the southern stream takes a general westerly direction for Dumpo strait, much of it diverging to the southward through the channels dividing the several groups of islands lying between Missana and Dumpo, and a portion turning off to the north-west, in the direction of Garras: this last is joined by the streams flowing through the Siolon and adjacent channels, which gradually trend away to the north-westward after they enter the strait.

The monsoons and currents of the China sea very much affect the regularity of the tides, which are strong and, at the springs, rush with great velocity through the channels among the islands, forming numerous eddies, and stirring up the mud. In the narrow part of the strait, about West point, this is particularly the case, the tide running from 3 to 4 knots and sometimes even 4½ and 5 knots.

Directions through Rhio Strait to Singapore.—Directions to proceed from Banka strait outside Linga island are given at page 340. A vessel intending to proceed through Rhio strait, and having brought Tanjong Eung, the eastern extreme of Linga island, to bear S.S.W. ½ W., and Great Domino West, should steer about N.W. ½ N., which, if care be taken to guard against the effects of the tide, will take her to the fairway of the entrance to Rhio strait, with Pulo Gin—which will be the first land seen on the starboard bow—bearing about N.E. ½ E., and Rodong peak about S.S.W. ¾ W.

In this track, if the course be duly preserved, the vessel will pass 7 or 8 miles outside Crocodile rock, and 5 or 6 outside Fly bank, and Pollux rock, and will have for about half the distance soundings of 15, 14, or 13 fathoms, when the depths will increase to 18, 19, or 21 fathoms. These deeper soundings will continue for 7 or 8 miles, when the depths will suddenly decrease to 12, 11, or 10 fathoms, on the sand bank, (*see* page 336), which runs in a S.S.W. direction from abreast of Pulo Gin. The soundings upon this part of the bank appear to be irregular, and it would seem that a vessel might get a cast of 19 or 20 fathoms when passing over it. After she is fairly over the bank the soundings will deepen to 15 or 14 fathoms, and continue so for 3 or 4 miles, when they will again become irregular, varying from 12 or 13 to 19 or 20 fathoms, until Pulo Gin is brought on the starboard beam.

The soundings do not give sufficient warning to keep a vessel clear of

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Crocodile rock, but in the event of her meeting with baffling or contrary winds or tides and getting towards this danger, Domino hill, the island lying between Great Domino and Tanjong Eung, should not be brought to the southward of S. ½ W., until the islet off the north-west end of Great Domino bears S.W. ½ W. Fly bank and Pollux rock must not be approached to a less depth than 13 or 12 fathoms.

At night or in thick weather, a vessel, after having brought Tanjong Eung to bear S.S.W. ½ W., and Great Domino West, should steer a N.N.W. ½ W. course for about 23 miles, and then N.W. ½ W. for about 28 miles, which, if proper allowance has been made for the tide, will keep her 10 or 11 miles eastward of the Fly and Pollux shoals, and place her in the fair-way of the entrance to Rhio strait, with Pulo Gin on the starboard beam.

Great difficulty has often been experienced by strangers in making out the entrance to Rhio strait, on account of the numerous islands in its vicinity. The high conical peak of Rodong (*see* page 335) should be made out as soon as possible, that being the first conspicuous object on approaching the strait, and if this can be discerned no difficulty will be found in making out the other points as the vessel proceeds.

Rondo, the small round island, on the west side of entrance of the strait, and to the southward of this, the peak of Rodong, the only hill of this feature in the vicinity, with South-west hill on Siolon, Talang island, and the extreme land to the eastward (Pulo Gin, with a flat peak near its centre) will, at a distance of 14 miles, readily show the approach to the strait, whilst, at a nearer distance, the Topies, Alligator, and other islands, cannot fail to point out its entrance.

Having brought the south end of Pulo Gin abeam, a N.W. ½ W. course will lead to the entrance of the strait, and Table hill, which is flat on the summit, and stands on the southern part of Galang island, should be seen a little on the port bow. In entering, borrow towards the islets near Galang, as the Topies have shoals extending one or 2 miles to the S.S.E., and one mile from their western sides; the soundings will decrease to 8 and 10 fathoms inside, and in some parts to 5½ or 6 fathoms.

Having arrived abreast of Little Garras, and distant from it about a mile, a N.W. ½ N. course will lead through the fairway of the channel till the Loban islands are abeam, a distance of 16 miles. With Loban Ketchil bearing East, distant a mile, a N. by W. course for 7 miles will take the vessel past Bintang, West point, which will bear about S.E.; a N. by E. or N. by E. ½ E. course will then lead midway between Pan reef and the dangers off the north-west coast of Bintang into Singapore strait.

The mark for passing eastward of Pan reef is to bring Barbukit hill (*see* page 350) to bear N. ¼ W. or North, but not to the eastward of North,

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and to steer that course until Johore hill * bears N.N.W. ½ W., which will lead north-eastward of both Pan reefs. A vessel will be clear of the Pan reefs when Pulo Nongsa opens of Nongsa point, and when the passage between the island and the point comes open, she may steer N.W. and W.N.W. as necessary for Singapore road. If the tide be setting to the westward a sailing vessel should be careful, especially in light or contrary winds, to get well over on the northern side of Singapore strait, otherwise she may be carried by the strong current to the westward of St. John, unable either to fetch into Singapore road, or, from the great depth of water, to anchor.

The channel westward of Pan reef is used by the native pilots in preference to the channel eastward of it (*see* page 350). Johore hill bearing N. by W. ½ W. leads nearly a mile to the westward of Great Pan reef, and about a quarter of a mile eastward of Little Pan; Sau lighthouse in line with east extreme of Innang Ketchil S. ½ E. leads through nearly in mid-channel between the reefs (*see* chapter II.).

Caution.—The beacons and buoys in Rhio strait cannot be depended upon, as they occasionally break adrift.

To work through Rhio Strait from the Southward.—It seldom happens that a vessel will have to work along near the islands from Missana to Dumpo; it is generally found advantageous to stand to the northward in case of meeting with a north-westerly wind, but it may occasionally happen that a vessel will derive advantage by standing towards them; in which case, when nearing the north side of Missana, in order to avoid the dangers which extend about three-quarters of a mile from that shore, the apex of Binan must not be brought northward of W. by N. To avoid the Rifleman shoal, which lies about 1¼ miles eastward of the north-east point of Binan, the eastern extreme of Missana must not be brought east of S.E. ½ E., or the northern extreme of Katang Linga north of W. by N. ½ N. This last also clears the 3½-fathom patch off the north part of Binan. The east side of Katang Linga may be approached to the distance of half a mile, and the northern part of the island to within a quarter of a mile. The Selanga islands and Oedik may be approached to within moderate distance, but care must be taken not to stand within a line drawn from the north extreme of Katang Linga to the north Selanga, or within another drawn from the last-named island to Oedik. (*See* page 345.)

In standing to the westward towards the south end of Pulo Galang, a vessel may approach the Great bank (*see* page 345) to 9 or 8 fathoms; but

* These hills bear a slight resemblance to each other, being of the same height, and of a pyramidal shape. Barbukit may be recognized by the low land adjoining it; Johore terminates abruptly to the point forming the east entrance of Calder harbour.

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between the Great and East banks, should tack at the first cast under 10 fathoms, as a 3-fathom bank projects far out from the island between Selatan and Dempo point, the eastern extreme of the group, and the soundings decrease suddenly towards it. To avoid this bank and also East bank, the south-east extreme of Selatan island should not be brought south of W. by S., until Dempo point bears west of N.W. by W. Pulo Rondo bearing S.W. $\frac{1}{2}$ S. also leads outside of East bank and all other dangers between that island and Dempo point, and is a safe turning mark.

Between Dempo point and Little Garras a vessel may stand into 8 or 7 fathoms, but to avoid Dittlof reef, Tyroem point the eastern point of Galang (which projects into the bay) must not be brought to bear south of W. $\frac{1}{2}$ S. until Little Garras lighthouse bears to the westward of N.W. Little Garras should not be approached nearer than a quarter of a mile, nor Great Garras than half a mile, to avoid their reefs: the soundings near the former are 11 to 22 fathoms, and 8 or 9 fathoms half a mile from the reef of Great Garras.

Between Great Garras and East Moeboet island, a vessel may stand into 8 or 7 fathoms, but a good tacking mark appears to be to keep Little Garras well open of Great Garras, and if this be attended to, it will keep the vessel clear to the eastward of the banks which extend $1\frac{1}{2}$ miles southward from Moeboet.

After passing Moeboet, its eastern extreme must not be brought eastward of S. $\frac{1}{2}$ E., until the southern extreme of Sembolang point bears W. by N. $\frac{1}{2}$ N., when the vessel will be clear of the bank which extends north-west of Moeboet; thence to Sembolang point she may stand into or 7 fathoms. At $1\frac{2}{3}$ miles E. by N. $\frac{1}{2}$ N. from Sembolang point lies a patch of coral with $5\frac{1}{2}$ fathoms water, and 6 to 8 fathoms near it; but half a mile nearer the point there are 11 or 12 fathoms, and close to the reef fronting Sembolang point 7 and 9 fathoms.

Sembolang point is fronted by a reef, but the pitch of the point may be passed at a quarter of a mile. The bay between that point and Tiemara bank is free from danger, and a vessel may stand into it as convenient, being careful not to bring the south-west extreme of Tiemara island west of W. $\frac{1}{2}$ N., nor the north-east extreme of Tiemara Ketchil north of N.W., in order to avoid Tiemara bank, over which there is as little as $1\frac{1}{4}$ fathoms water.

Tiemara Ketchil should not be approached nearer than half a mile, as there are 12 to 21 fathoms, close to the reef which extends from it, so that the lead cannot be relied upon to give warning in sufficient time. After passing this island, its north-east extreme kept to the southward of S.S.E. $\frac{1}{4}$ E., will serve as a good tacking mark as far as the buoy on Innang reef, leading outside Johannes shoal (*see* page 348), and clear of all danger.

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To avoid the dangerous reef which extends nearly half a mile from Pulo Innang, the north-east point of Innang Ketchil must be opened of the eastern extreme of Pulo Sau (with the lighthouse upon it) after passing Innang shoal buoy, and if this be attended to, a vessel will keep outside all danger as far as the eastern extreme of Sau, which should not be approached nearer than half a mile on account of the small reef lying a quarter of a mile south-east of it.

After passing Innang Ketchil, in standing to the westward, do not shut in the eastern extreme of Pulo Sau behind Innang Ketchil, this will lead safely along that side of the channel as far as the buoy on Malang Orang shoal, in about 10 to 15 fathoms water. If this buoy should have disappeared, the eastern extreme of Innang Ketchil if not brought east of S. by E. will lead clear of that danger.

Tanjong Sau, not brought to bear to the southward of S.W. ½ W., will lead clear of the south-eastern edge of Pan reef; and when passing to the eastward of that danger, care must be observed not to bring Barbukit hill to the eastward of North, until Johore hill bears N.N.W. ½ W.; and then not to bring the last-named hill to the northward of N.N.W. ½ W. until Pulo Nongsa is open of Nongsa point.

In working between the Pan reefs, after having passed the buoy on the Malang Orang, care must still be taken not to bring the eastern extreme of Innang Ketchil east of S. by E., or to stand inside a line drawn from Malang Orang buoy to the Little Pan reef buoy, in order to avoid the dangerous shore reef which extends from Battam nearly three-quarters of a mile.

In standing to the eastward towards Pulo Talang, at the southern entrance of Rhio strait, be careful to give the south-eastern shore of that island a berth of 2 miles, and to keep South-west hill, on Siolon island, well open to the westward of Talang, to avoid Hendrik Jan rock (*see* page 351). The south-west point of Siolon and Alligator island may be approached to half a mile. When nearing the Topies, South-west hill kept well open of the southern point of Alligator island, will lead southward of all danger on that side of the group; and, in order to keep to the westward of Rotterdam reef, the south-western extreme of Pulo Pankel must not be brought to the westward of N.W. ½ W.

To clear the shoal water (4 to 5 fathoms), which extends nearly 2½ miles southward of the Topies, Siolon hill must be kept open of S.W. hill, which will lead south of it, and the apex of Pulo Loban open of the west extreme of Pulo Pankel leads to the westward, also to the westward of the Dutch shoal bank of soundings south-eastward of Pankel.

It is not advisable to stand over between the Topies and Pankel, on account of Rotterdam reef, which lies N. by W. ½ W. nearly half a mile

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from the northern island of the Topies group; and Dutch shoal of 3 fathoms lying S.E. ¼ E. nearly 1½ miles from Pulo Pankel.

The Dutch shoal, south-east of Pankel, will be avoided by keeping the south-west extreme of Pankel to the northward of N.W. ½ N.; and the northern Topie island, if not brought south of E. by S. ½ S., will lead to the southward.

The south-west end of Pankel should not be approached nearer than half a mile on account of the shore reef, close to which are 13 fathoms water; the west side may be neared to 7 or 8 fathoms, but the northern end should not be approached within a mile on account of the shoal water extending N.N.W. from it; this shoal water may be avoided by keeping Little Garras lighthouse open of the south-west extreme of Pankel.

Between Pulo Pankel and Isabella shoal, a vessel may stand to the eastward into 8 or 9 fathoms; but should not bring the north end of Pankel to the southward of S.S.E. ¼ E. or Terkolei lighthouse to the westward of N. by W., to avoid the Soré reefs. Terkolei lighthouse bearing E. ½ N. leads to the southward of Isabella shoal, and Sau lighthouse in line with the west end of Loban Ketchil leads well clear to the westward.

Loban Ketchil should not be approached nearer than half a mile, and, after passing it, the western extreme should not be brought south of S. by E. ¾ E., until Tanjong Batu bears East, which will avoid the dangers near Dessa island. Tanjong Batu is steep-to; and both it and Pulo Dua may be approached to a quarter of a mile, but not nearer the latter, on account of the reef which fronts it, and near to which are 8 and 10 fathoms. West point of Bintang is bold, and may be approached to a quarter of a mile, but the reef which begins at this point extends outside Malang Yarong and Kera islands, and fronts the whole of the north-west coast of Bintang. Malang Yarong may be approached to a quarter of a mile, but Kera island not nearer than three-quarters of a mile. There are 7 and 8 fathoms close to the edge of the bank which fronts this part of the coast.

After passing Malang Yarong great care must be taken when standing in for the Bintang shore to avoid the dangerous bank which curves away from that island and extends half a mile outside Pulo Kera; this bank has 12 or 13 fathoms water close-to Sau lighthouse bearing S.S.W. ½ W. will lead well clear of it, as also of the Netscher and Crocodile shoals. If Sau lighthouse cannot be made out after Pulo Kera bears southward of East, Malang Yarong island—which will be seen well clear of the extreme of the land as Netscher shoal is neared—must not be brought west of S. by W. ¾ W. until the screw pile beacon on the north end of the Pan reef bears W. ½ N. a vessel will then be to the northward of Netscher shoal, and Pulo Kera may be brought S.S.W. but nothing to the westward, until Tanjong

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Subong bears S.E. by E., by which means a vessel will avoid all the dangers off the north-west coast of Bintang, including the Crocodile shoal.

Through Rhio Strait from Singapore.—The ebb tide from Singapore meets the flood setting through Rhio strait in the vicinity of the Pan reefs ; vessels therefore weighing at high-water from Singapore will carry a fair tide through both straits.

The flagstaff on fort Canning, Singapore, bearing West, leads 2 miles southward of the Johore shoals; and when Johore hill bears North, a vessel will be eastward of the shoals. Entering Rhio strait, pass between the Little Pan buoy and the screw pile beacon on Great Pan; or, pass eastward of the Pan reefs, and in doing so, be careful not to bring Johore hill to the northward of N.N.W. ½ W. until Barbukit hill bears North (*see* foot note, page 364.)

Thence a South course will lead down the fairway of the strait until the vessel has arrived nearly abreast West point of Bintang, when S. by E. is the mid-channel course as far as the Loban islands. From abreast Pulo Loban Ketchil a course about S.E. ¾ S. making allowance for tide, will lead mid-way between Pankel and Moeboet, also between the Garras islands and the Topies, and out of the strait.

To work through Rhio Strait from the Northward.—In working between the Pan reefs, the screw pile beacon on the north, the buoy at the south end of the Pan reef, will point out the situation of that danger, but when standing towards the Battam shore, in order to avoid the dangerous reef extending three-quarters of a mile from the land, care must be taken not to stand inside a line drawn from Malang Orang buoy to the Little Pan buoy, nor to bring the eastern extreme of Innang Ketchil east of S. by E. If proceeding by the eastern channel, in rounding the Pan reefs, do not shut Pulo Nongsa in behind Nongsa point, until Johore hill bears N.N.W. ½ W., and then not to bring Johore hill to the northward of that bearing until Barbukit hill bears N. ¼ W. or North. The last-named hill must not be brought at all to the eastward of North when on the east side of Pan reef.

Standing towards the north-west coast of Bintang,—to avoid the Crocodile shoal, Barbukit hill should not be brought west of N. by W. ¼ W.; if Barbukit cannot be seen, Kera island must not be brought west of S.S.W.; or tack in 10 or 9 fathoms. When the screw pile beacon on the Pan reef bears north of West, a vessel will be nearing Netscher shoal, and must avoid bringing the small islet of Malang Yarong—which will be seen well clear of the extreme of the land—west of S. by W. ¾ W., or Sau light-house west of S.S.W. ½ W.; this last precaution will also clear the dangerous bank between Kera island and Malang Yarong. The soundings

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decrease so suddenly about this part of the coast that they must not be relied on to give warning in time to avoid the dangers.

Kera island must not be approached within three-quarters of a mile, but Malang Yarong may be to a quarter of a mile. A reef rounds away from Malang Yarong to West point, having depths of 8 or 7 fathoms close-to, and it must be given a berth from three-quarters to half a mile until abreast West point, which is rather bold. Pulo Dua must not be neared within a quarter of a mile, on account of the surrounding reef; and all danger between Dua and Loban Ketchil will be avoided by keeping the west end of the latter island east of S. by E. $\frac{3}{4}$ E., or by not bringing West point west of N. $\frac{1}{4}$ W.

Standing to the westward, when near the south side of Pan reef, Tanjong Sau should not be brought south of S.W. $\frac{1}{2}$ W., which will clear the Pan reef, and also the Malang Orang reef, in case the buoys upon these dangers should have disappeared. From Malang Orang buoy to Pulo Sau, keep the east point of Sau open of Innang Ketchil, to avoid the dangers which lie north-westward of Sau.

The eastern point of Sau is bold on its northern side, but south-east of it is a small reef, a quarter of a mile distant, which should be given a wide berth; after passing this small reef, be careful to keep the eastern extreme of Innang Ketchil open of the eastern extreme of Sau, to clear the long spit which projects from the latter island, and also to avoid the reef extending from Pulo Innang. Close to this reef are 8 or 7 fathoms, and 14 or 15 fathoms about half a mile off.

The same objects in line will lead to the eastward of Innang reef buoy, towards which, if desirable, a vessel may stand a little closer, after which keep the east extreme of Tiemara Ketchil south of S.S.E. $\frac{1}{4}$ E., to avoid the Johannes shoal. Tiemara Ketchil is fronted by a reef, and should be given a berth of at least half a mile. After passing this island the Tiemara bank will be avoided by not bringing the north-east extreme of that island to the north of N.W., until the south-west extreme of Tiemara is north of W. by N., when a vessel may stand into the bay towards Sembolang point, as convenient, tacking in 8 or 7 fathoms.

Sembolang point may be approached to a quarter of a mile in 10 or 9 fathoms. After passing this point, do not bring its south extreme to the west of W. by S. until the eastern extreme of East Moeboet bears S.S.E. to avoid a bank which extends N.N.W. of that island. Between East Moeboet and Great Garras a vessel may stand into 8 or 7 fathoms, but a good mark for tacking is, to keep Little Garras well open of the east extreme of Great Garras, this will also clear the bank, which lies about $1\frac{1}{2}$ miles to the southward of Moeboet.

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Little Garras island may be approached to a quarter of a mile, but Great Garras not nearer than a mile. After passing Little Garras, the lighthouse must not be brought to the westward of N.W. until the east point of Galang (which projects into the middle of the bay to the southward), bears W. ½ S., in order to clear Dittlof reef. Tjassens shoal, which fills up a great portion of this bay, may then be approached to 9 or 8 fathoms.

Dempo point should not be approached nearer than half a mile, and after passing this point do not bring it north of N.W. by W. until the south-east extreme of Selatan bears west of W. by S., which will keep a vessel clear of East bank and the shoal bank filling up Selatan bay. Pulo Rondo or Dumpo bearing S.W. ½ S. also leads outside of East bank, and all other dangers between that island and Dempo point, and is a safe tacking mark.

Between Pulo Rondo and Katang Linga a vessel may stand well over towards Oedik and Selanga islands, but must avoid standing within a line drawn from the northward of the last-named islands to the north-west extreme of Katang Linga. The east side of Katang Linga should not be approached nearer than half a mile, and in order to avoid the Rifleman shoal, (which lies about 1¼ miles eastward of the north-east point of Binan,) the northern extreme of Katanga Linga must not be brought north of W. by N. ½ N. (this also clears the 3½-fathom patch off the north part of Binan), nor the eastern extreme of Missana east of S.E. ½ E.

Having passed the Rifleman shoal, if the apex of Binan be not brought to the northward of W. by N. the dangers which extend about three-quarters of a mile from the north side of the Missana will be avoided.

Standing to the eastward, Loban Ketchil should not be approached nearer than half a mile, and Sau lighthouse in line with its west extreme will clear the west end of Isabella shoal, the southern part of which will be avoided by not bringing Terkolei lighthouse east of E. ½ N. Between Isabella shoal and Pankel, a vessel may stand into 8 or 9 fathoms, but in order to avoid the Soré reefs do not bring Terkolei lighthouse to the westward of N. by W. or the north end of Pankel to the southward of S.S.E. ¼ E. Little Garras lighthouse open of the south-west extreme of Pankel will lead clear of the shoal water extending N.N.W. from the north part of that island; its west side may be approached to 8 or 7 fathoms: shoal water extends from the south-west extreme, close to which are 13 fathoms water; it should not be closed nearerthan half a mile. The apex of Loban open of the west extreme of Pankel, will lead clear of the Dutch shoal, and of the shoal bank of soundings south-eastward of Pankel; this mark will also lead to the westward of the shoal water—4 to 5 fathoms—which extends nearly 2½ miles southward of the Topies, and Siolon hill open of S.W. hill will lead to the southward. The shoal bank, just mentioned, is not

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dangerous to small vessels which may stand nearer to the Topies, but in order to avoid Rotterdam reef the south-west extreme of Pankel must be kept north of N.W. ½ W.

To the southward of the Topies, Alligator island may be approached to half a mile, and a vessel may stand on well into the channel between Siolon and Talang, but must not bring S.W. hill to the west of W. ¾ N. on account of Thomas shoal. There are many shoal patches between Talang and Pulo Gin, but they all (except the Hendrik Jan rock) lie out of the track of ships. The south-east side of Talang should be given a berth of at least 2 miles in passing, keeping South-west hill well open of Talang, until Pulo Terobi bears E. by N.

To Rhio from the Southward.—Vessels bound to the anchorage off Rhio, having entered the strait, *see* page 363, should steer for Alligator island, and pass between it and the Topies, keeping within a mile of Alligator island, to avoid the dangers which lie more than half a mile south-eastward of the Topies. Having brought the eastern Topie to bear West, and about a mile distant, a N.W. by N. course will lead to the entrance of the channel between Soré and Basing islands. In this track the soundings about a mile off S.W. hill are from 6 to 10 fathoms, with occasional casts perhaps a fathom or two deeper; half a mile south of Alligator island 10 or 12 fathoms, and 9 or 8 fathoms further to the southward; between Alligator island and the Topies 7 to 10 fathoms, deepening to 15 or 23 fathoms near Alligator island, and decreasing to 7, 6, or 5 fathoms towards the Topies. After having shaped a N.W. by N. course, as above directed, 5 or 4½ fathoms will be found for about half the distance to the entrance of the channel between Soré and Basing islands, when the depth will increase to 7 or 8 fathoms, and as Rupels reef beacon comes abeam, to 12 or 14 fathoms; in the fairway of the channel 14 to 18 fathoms will be found.

The northern Topie bearing S. by E. ½ E. will lead through in mid-channel between the reefs and shoals extending from Soré island, and the shoal bank which extends from Basing island, to a quarter of a mile off Tanjong Dompa; this latter bank is steep-to, while that on the Soré side shoals gradually. Having passed Tanjong Dompa vessels may steer about North—with Loz island open of the west extreme of Pitjingit—until they arrive off the anchorage in Rhio road. It must not be forgotten when standing into the road that the bank shoals suddenly under a depth of 3 fathoms.

Vessels of moderate draft being on the western side of the strait, about a mile eastward of Little Garras, should steer N. by E. or N.N.E. according to circumstances, to pass between Rotterdam reef and Dutch shoal, (crossing the bank with 3½ to 3 fathoms water over it which

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extends south-eastward from Pankel,) thence through the channel between Soré and Basing island, to the roadstead as before directed.

To Rhio from the Northward.—Having entered Rhio strait, as directed at page 368, and reached a position about a mile to the westward of Loban Ketchil, a south-easterly course should be steered, keeping Sau lighthouse open of Loban Ketchil until the lighthouse on Terkolei bears E. ½ N. when an E. by S. course will lead about a mile south of the black buoy off Terkolei and thence to the anchorage in the road.

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CHAPTER X.

VARELLA AND DURIAN STRAITS.

VARIATION 1° 20′ East, in 1878.

GENERAL REMARKS.—Vessels bound from Banka strait to Singapore during the strength of the N.E. monsoon frequently adopt the Inner route by the Varella and Durian straits (*see* page 152). During the prevalence of strong northerly winds in the months of December and January, sailing vessels will save much time by doing so,* for here they will have smooth water, good anchorage, and but little tide, whereas on the eastern side of Linga at this season of the year, there is generally a heavy sea, and a southerly current sometimes running at the rate of 3 knots an hour. In Varella strait they will also be greatly assisted by the squalls from the Sumatra coast.

Varella, or Brahalla strait, is situated at the southern part of this route, and Durian strait at its northern part; the intermediate portion has not received a specific denomination. The entire route is about 120 miles in length from Pulo Varella to the Carimon islands, and is bounded on the western side by the coast of Sumutra, False Durian, Sabon, and the contiguous islands; and on the eastern side by Sinkep and the other islands off the south and west coasts of Linga, and by Great and Little Durian, and the adjacent islands.†

SUMATRAS.—The following useful observations upon the Sumatras, or heavy squalls which are common in these straits, are by Captain McKenzie :‡—"On the west side of Sinkep and Linga and through Durian strait, there will be regular tides, and good slants of wind with the Sumatras. It often falls calm before they come, and if the tide be foul, a kedge that could be handily weighed would be sufficient to drop, and the canvas then reduced; double reefed topsails will do for the first puff, and nothing is lost by being prepared for a heavy gust, as I have passed, and seen many country vessels pass, strangers in the straits of Malacca, in the height of a Sumatra, that have been kept before the wind

* Mr. W. Stanton, Master R.N., 1860.

† *See* Admiralty charts:—Banka strait to Singapore, No. 2,757, scale $m = 0{\cdot}15$ of an inch; Linga and Sinkep channels, No. 1,789, scale $m = 0{\cdot}10$ of an inch; Singapore strait, No. 2,403, scale $m = 0{\cdot}66$ of an inch; and Durian, Muro, and Jombol straits, No. 2,402, scale $m = 0{\cdot}65$ of an inch.

‡ Nautical Magazine, 1847.

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with all their canvas flying about, and of course running dead to leeward, whilst the country vessel was steering her course under snug canvas; and at daylight the other vessels were out of sight astern."

TANJONG BON or Jaboeng.—The coast of Sumatra from Batakarang point to Tanjong Bon, has been described at page 328. Tanjong Bon, in lat. 0° 58′ S., long. 104° 22′ 30″ E., is the south-eastern limit of the Inner route. Like most other parts of the east coast of Sumatra, it is low land, and has a shoal water bank extending more than a mile from it.

VARELLA or Brahalla is a small island 450 feet high, having a hill on its western part which may be seen 20 miles. It lies in the middle of Varella strait, and bears from Tanjong Bon, N. ¾ E. 10 miles, and from Pulo Taya, W. ¾ S. 30 miles.

Horsburgh says that there are some islets and rocks near Varella, the largest of which, Anak Varella, lies about a mile north-eastward of it, having 7 to 9 fathoms water between it and the principal island; and a mile north from Anak Varella lies a rock, with 17 fathoms close to it, having a channel 2 miles wide, with 10 to 16 fathoms, between it and the Middle rocks.

Water.—Horsburgh also states that there is anchorage on the south-west side of Varella, and water may be procured; but this only ought to be done in case of necessity, as the lurking piratical proas have been known to assault and massacre the crews of boats sent on shore to procure water at this island. The ship *Hercules* was attacked by seventeen large proas near this place, and narrowly escaped being taken by them.*

SHOAL.—Captain G. Kunst, of the Dutch barque *Louisa Kroon Prinses of Sweden*, reports having seen a shoal, with but 12 feet water over it, from which Varella island bore W.N.W., distant 3 miles.†

MIDDLE ROCKS lie 4½ miles N.E. by N. from Varella, or nearly midway between the latter and the islets which front the south end of Sinkep island.

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* Although piracy has very much decreased in these seas since Hosburgh's time, and as a general rule, but little danger need now be apprehended from piratical fleets, yet Llanun pirate proas have been known to pass through Banka strait within the last few years. It is still, in fact, very necessary indeed for merchant vessels which have occasion to fill up water in out of the way places to be on their guard against surprise. Natives, not ordinarily pirates, frequently become such if a good opportunity present itself, and merchant vessels offer such rich prizes, that the natives of almost any part of the Eastern seas would very likely be tempted to attack them, if they saw a favourable opportunity for doing so successfully, when many of the crew were away from the ship watering.—J. W. Reed, Master R.N., 1864.

† Singapore Straits Times, 10th September 1864.

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POLLUX ROCK with only 4 feet water over it, lies nearly 2 miles N.E. of the Middle rocks, and from it the nearest of the islets southward of Sinkep bears N. by W. 3½ miles, and Anak Varella islet S.W. ½ S. nearly 5½ miles.

CHANNELS.—The channel southward of Varella island is wider and more free from danger than the channel northward of it, and is consequently much more frequented. The shoal bank fronting Tanjong Bon, projects about 8 or 9 miles north-westward from it, forming a sort of elbow, to avoid which it will be necessary to keep Tangjong Bon to the south of S.E. ½ S., until Varella island is east of E.N.E.

The channel to the northward, between Varella and the small islands contiguous to the south-east end of Sinkep, is encumbered with the dangers just mentioned. Between the Pollux rock and those islands it appears to be clear, although the chart has but few soundings. Between Varella and cape Boekoe, the south extreme of Sinkep, the channel is about 10 miles wide, with depths of 12 or 14 fathoms on either side, and 15 to 20 fathoms in mid-channel.

SINKEP, the easternmost of the three islands forming the north side of Varella strait, is about 17 or 18 miles in extent, and of very irregular shape, projecting to a point on its east side, another on its south-east side, and a third on its south side. Between these points are rather large bays, the most southern Baroe bay, being 3 miles deep. On the eastern side of the island is a range of hills, with a peak 1,440 feet high near the centre of the range. There is a hill over cape Boekoe, and 4 miles to the northward of it, on the west coast of the island, is a sharp peak of moderate elevation. From cape Boekoe the coast trends in a north-westerly direction for 14 miles to Saboyoro strait, which separates Sinkep from the island next westward of it. Rocks above and below water front the whole south-west coast of Sinkep, to the distance of a mile.

Saboyoro strait is about two miles broad, but its entrance is contracted to half that breadth by reefs projecting from the points of Sinkep and the island westward of it. This strait is very imperfectly known, and no directions can be given to guide a vessel through.

Rawa is the outer of two islands westward of Sinkep, their south-west coast lines following the same north-west direction as that of Sinkep, the whole distance, from cape Boekoe to the north-west extreme of Rawa being 23 miles. The islands are separated by a channel so narrow that they appear as one. Shoal water extends 2 miles from the south-east point of the eastern island, but gradually lessens in distance from the shore to the north-westward, until at the north-west end of Rawa it projects only a quarter of a mile.

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SINKEP LAOET is the outermost of four or five small islets lying about 2½ miles off the south-east point of Sinkep.

SEERA or Reef Island, is small, 160 feet high, and lies E. ¾ N. 6½ miles from cape Boekoe, and N.W. ¼ N. 14 miles from Varella island. Horsburgh describes it as a flat, low island, sometimes mistaken for Varella when coming from the northward. There are three small islets off its north-west end, and one off its south end, inside the edge of a reef which surrounds the island, and extends more than a mile from its east end, and more than 2 miles from its north-west end.

At 4 miles W. by N. ½ N. from Seera, is a patch having 4 fathoms least water over it.

ANAK SEERA are rocky islets lying about 2¾ miles N. by E. from Seera, with a safe channel between them and the latter island, and also between them and the coast of Sinkep. A bank with 2 to 3 fathoms water over it, extends from them about 2 miles in a north-westerly direction.

Some patches of 4½ and 5 fathoms, lie from 4 to 6 miles N.W. by N. from Anak Seera, having, apparently, a channel between them and the reef extending from Sinkep.

SPEKE ROCK, on which a ship of this name struck, lies W. by N. ¼ N., 9 miles from Seera island, and S.E. 5½ miles from the southern Alang-Tiga island. It is of small size, and a portion of it uncovers at two-thirds ebb, showing as a small black rock about the size of a boat. Close to are 10 fathoms water. Boekoe point kept open to the southward of Seera island, E. ¼ S., leads to the southward, and the southern Alang-Tiga island bearing N.W. by N. leads to the westward.

There is a safe passage between the Speke rock and Seera island, and also between the Speke rock and the Alang-Tiga islands, on the east side of the Alang-Tiga. The soundings in this passage are generally from 7 to 9 fathoms, muddy bottom, sometimes sand; but the western channel is preferable on account of the Atkin rock.

ATKIN ROCK on which the brigantine *Bob Tail Nag*, Capt. Atkin, struck in May 1863, is a pinnacle which uncovers at two-thirds ebb. At low tide the rock is about the size of a ship's launch, and has deep water all round:* when covered, unless the tide is running strong, there is no indication of it. The marks for the rock are, the west extreme of the north Alang-Tiga island just shut in by the east extreme of the middle island, and the south extreme of the southern island bearing N.W. by W. ¾ W., distant three-quarters of a mile.

ALANG-TIGA ISLANDS bearing N.W. ½ W. 29 miles from Varella, are a group of five small islands, and some rocks above water.

* H.M.S. Rifleman, in February 1864, searched in vain for this rock.

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The three principal islands are high, and may be seen from a distance of 24 or 25 miles, and the others 13 or 14 miles. There are 7 fathoms close to the islands; and half a mile off the north end of the southernmost lie two rocks, each about the size of a longboat. When bearing N.N.E., and N. by E., the islands are in line with each other, and they open when the southernmost bears N. by W. ½ W.

These islands may be passed at any prudent distance on their western side; the depths being mostly from 6 to 9 fathoms, mud, in the fair channel. In working, the coast of Sumatra may be approached to 6 fathoms water, and from this depth to 8 or 9 fathoms towards the islands is a fair track, although the soundings are not always regular, 7 fathoms being the general depth directly westward of the islands until near the mainland.

SILENSENG, or Green Island, 119 feet high, lies 2¾ miles north-westward of Rawa island, and is separated from it by a safe channel with depths of 10 to 19 fathoms. The island is surrounded by a shoal which extends farthest from its north extreme, where it projects three-quarters of a mile.

WRIGHT ISLAND, or Boenta, is small, lying 1½ miles northward of Silenseng. Some rocks appear to extend about a quarter of a mile from it.

JAMBIE RIVER.—From Tanjong Bon (page 374) the coast of Sumatra trends in a westerly direction to Jambie point, whence it recedes to the south-westward, to the principal entrance of the Jambie river, also named on the chart the river Nior. There are, however, between this entrance and Tanjong Bon, several other entrances, off the mouths of the two easternmost of which lies an island named Berba.

The chart does not show many soundings off the main entrance of the Jambie, but there appears to be good anchorage in 6 to 8 fathoms, 7 or 8 miles northward of its mouth. The river is barred, and has a depth of 1½ fathoms over the bar, and 4 to 8 fathoms inside.

Two beacon buoys are moored at the Nior entrance in 3½ fathoms; the northern buoy is pointed white, and the southern black; the mouth of the river within the buoys is marked by floating beacons; those on the starboard hand on entering have each a ball, and on the port hand a cross.

There are several towns and villages on the banks of this river, the principal of which is Simpang about 20 miles, and Jambie about 50 miles from the entrance.

This part of Sumatra is under the Dutch, who have a station and fort at Moeara Kompeh, a town 5 miles above Simpang.

Coal.—A fine seam of coal was (in 1860) discovered near the Sultan's

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house at Jambie. It is said to be 12 feet thick, close to the river, and at some distance below the surface quite equal to English Newcastle coal.

BASSO, or Bakauw Point, in lat. 0° 20′ S., 103° 45′ E., is the south-east extreme of Basso island, which projects in the form of a peninsula from the main coast of Sumatra in an E.N.E. direction about 13 or 14 miles, its breadth being about 5 or 6 miles. It bears N.W., and is distant about 52½ miles from Tanjong Bon, the coast line between receding into a large bight, 33 or 34 miles deep, the main entrance to the Jambie river, just described, being situated at its head.

The eastern face of Basso island should not be approached nearer than about 2 miles, as a shoal, steep-to, projects nearly a mile from it.

AMPHITRITE BAY and INDRAGIRIE RIVER.—Amphitrite bay is a large bight about 16 miles deep, formed between the north-east extreme of Basso island, and Tanjong Baroe, or Dato, 15 miles to the northward. The bay is nearly filled by a shoal, which extends several miles from either shore. It projects in a N. by W. direction (Horsburgh says N. by E.) for 5 or 6 miles from the south point of entrance, but it curves away more gradually from the north point, and between these projections is the deep-water portion of the bay, about 3 or 4 miles broad.

The large river Indragirie discharges itself through several channels into Amphitrite bay, and also into the bay between Tanjong Bon and Basso island.

Caution.—The outer edges of the shoal extending from the points of entrance to Amphitrite bay, especially from the southern, is steep-to, having 10 or 11 fathoms within half a mile of it in some places, then quickly 5 or 4 fathoms, to 9 or 6 feet water upon it, which requires great attention to the lead, when approaching this part of the coast in the night.*

Horsburgh says that Dato point may be approached to 1½ miles, or to 8 or 9 fathoms, but the point itself appears upon the chart to be steep-to, and to shoal suddenly under 12 fathoms.

The SUMATRA COAST.—All this part of the coast of Sumatra is flat low land, thickly wooded with trees about 120 feet high.

From the low headland of Dato point, the coast trends N. by W. and N.N.W. towards Durian strait, and is fronted by a shoal bank from 2 to 6 miles off shore, which may be approached by the lead, as from 10 fathoms upon its edge the soundings gradually decrease to 6, 5 4, and 3 fathoms.

CHANNELS between SINKEP and LINGA ISLANDS.—Pulo Ponoebo, 5 or 6 miles long, east and west, 2 miles

* Horsburgh, vol. II. p. 64.

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broad, and having a hill 955 feet high near its centre, lies between Sinkep and Linga, dividing the passage between those islands into two channels, named Lima and Ponoebo straits.

Lima Strait, between Pulo Ponoebo and Linga, is narrow, much encumbered with islets and dangers, and does not, upon the chart, appear to be a very convenient channel for navigators unacquainted with it. Captain McKenzie, however, says* that it is safe and quickly passed through with the tide; and that on its western side, just beyond the narrows, there is a small bay on the Linga shore, with good anchorage, wood, and water.

Horsburgh states that Lima strait is a short route from Linga road to Durian strait, the soundings in it varying from 7 to 14 fathoms, that it may be navigated with care by vessels of moderate size, and furnishes the following directions :—If bound from Linga road to the westward, through Lima strait, steer out to the southward and south-west, till near the north-east part of Sinkep, to give a berth to the islets off Tanjong Bongon, the west point of Linga bay, and the extensive shoal which stretches thence to the road. Having passed about mid-channel between the islets off Tanjong Bongon and those near the southern shore, steer for Tanjong Labodado, the south-west point of Linga, and the depths will be 12 and 14 fathoms near the islets and rocks on the south side the strait, and 9 or 10 fathoms towards the Linga shore; the bottom hard in the eastern part of the strait, and soft to the westward. Having passed Tanjong Labodado, steer about W. by N., in soundings of 11 to 9 and 8 fathoms, soft ground, and passing to the northward of Pulo Pandan, about 2 miles distant, in 7, 8, or 9 fathoms, steer to the north-westward for Durian strait.

Ponoebo Strait, between Sinkep and Ponoebo islands, is, like Lima strait, very narrow and encumbered with islets and dangers. We have no directions for it; but, judging from the chart, it appears that it may be entered from the eastward between the small islets Serang, Tenga, and Kekker, and a mid-channel course followed through its narrowest part. After passing the narrows, keep within three-quarters of a mile of Ponoebo, to avoid two rocky patches, with only 12 and 18 feet water over them, nearly in mid-channel at the western end of the strait. The soundings in the narrow part of the channel are 15 to 20 fathoms, but at the western end there are not more than 4 or 5 fathoms between the rocky patches and Ponoebo, and only 3½ to 5 fathoms between them and Sinkep, on which side, also, but a vessel of moderate draft may probably pass through with safety.

PULO SETJAWA lies close to the north-west extreme of Linga, from which it is separated by Dasie strait, about half a mile broad. Only

* Nautical Magazine, 1847.

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the west coast of this island is delineated on the chart; it is shown as trending nearly straight in a north-westerly direction about 14 or 15 miles, the shore being fronted to a short distance by reef.

Close to the north-west part of Setjawa lie two small islands named Great and Little Blando, the latter, which is the north-western one, having two islets near its west side.

TIAMPA STRAIT.—Tiampa, an irregularly shaped island, 5 miles long, in a north-west and south-west direction, and 1¾ miles broad, is separated from the north-western part of Setjawa and the Blando islands by Tiampa strait, 2 miles wide, having depths of 13 to 29 fathoms. In the northern entrance of this strait lies a narrow bank, 2½ miles long, having only one or 2 fathoms water with 8 to 14 fathoms in the narrow passage between it and Blando islands. The channel between the bank and Tiampa is a mile wide, with depths of 9 to 16 fathoms.

BOEAYA ISLAND lies 3 miles westward of the north-west point of Tiampa, and in the channel separating them there is a group of islets and rocks. Boeaya nearly three miles in extent, is a remarkable island, rising to a peak 888 feet high.

Dian is the south-easternmost and Lobam the north-westernmost of a chain of islets fronting the south and south-west sides of Boeaya, from which they are separated by a channel with depths of 12 fathoms, but there is a rock near the west side of Boeaya.

The Leda rock is the outermost of a ridge of rocks which extend about 1½ miles in a N.W. by W. direction from Lobam.

TEMIANG GROUP.—This group with the other islands and dangers between Boeaya and Potong islands lie far to the eastward of the usual track for vessels bound through Durian strait, but it seems advisable to describe them for the benefit of navigators who may wish to pass through any of the channels leading into or from Rhio strait. This group is composed of four large and several small islands, lying to the north-westward of Setjawa and Sebangka, and separated from those islands by a narrow channel, which appears to be obstructed by numerous rocks. Temiang island, which limits the group to the north-eastward, is 7 miles long in a north-west and south-east direction, 3 miles broad, and irregularly shaped, the north-east side being nearly straight, but at the south-east end there is a deep bay or inlet, there is also an inlet at the north-west end, but not so deep. This island, which is the largest of the group, is mostly composed of high hills, and near the west end is some table land elevated 800 feet.

The three other principal islands which lie close to the south-westward of Temiang, are divided from it and from each other by narrow channels, and the group is limited in that direction by a small island with islets or rocks N.W. and S.E. of it, the whole extending about 3 miles. Close off,

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the north-west end of Temiang is Pintoe island about 1⅓ miles long; and off the north-west end of Pintoe is Kebat island. All the islands are fringed with reefs.

POMPON ISLAND situated S.W. by W., about 2 miles from Kebat; is rather more than half a mile in diameter, having in the centre a hill 433 feet high. A rock, awash at high water, lies close off its north-west point, there are also detached rocks above water surrounded by a reef, at three-quarters of a mile N.E. by E. from Pompon, and N.W. ½ N., the same distance from the north-west islet of the Babie group, which lies between Pintoe and Pompon islands.

Pompon Reef, N. ¾ E., 2¼ miles from Pompon island consists of three or four rocks several feet above water, which at a distance appear like boats' sails; they are nearly north and south of each other, and extend about a quarter of a mile. A rock awash lies a quarter of a mile to the westward, and between are soundings of 5 to 8 fathoms, with 12 to 15 fathoms close to the shoal.

Irene Rock, said to lie W. by N. ½ N., about 7 miles from Pompon island, could not be found by the *Rifleman* in the course of a four hours search, but the examination was insufficient to disprove its existence.

Boeaya island bearing S.E. by S. or Potong island north, leads about 4 miles to the westward of the position assigned to this rock.

ALLOR is a round island, nearly a quarter of a mile in diameter, and 139 feet high, lying 4 miles northward of Kebat, the north-west extreme of the Temiang group. A small islet, or rock, lies two cables north-eastward and two others about one cable W.N.W. of it, the whole being connected by a reef.

PANGALLAP ISLAND, 3 miles long, in a N. by W. ¼ W., and S. by E. ¼ E. direction, and half a mile broad, is moderately elevated, the highest hill on the southern part being 246 feet, and that on the northern 267 feet high; the island is fringed by a reef, which projects in places on the east coast to a distance of a quarter of a mile, but on the west coast ledge is nearer the shore. Some flat rocks, just above water, lie one cable south-eastward of the south point. The channel between Pangallap and the reef extending from Allor, is 3 cables broad, with depths of 7 to 23 fathoms.

DEDAP, about half the size of Pangallap, lies to the westward of that island, from which its southern and nearest part is distant three-quarters of a mile. The island lies in a S.E. by S. and N.W. by N. direction.

Off the south-east end of Dedap are three small islets and a rock lying nearly on a line S.E. by S. from that island, the rock being distant about

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half a mile. At one mile from the island in the same direction are two rocks awash, from the outer of which the south end of Pangallap bears N.E. ¾ E., and the south extreme of Allor E.S.E. The channel eastward of these rocks, and between Dedap and Pangallap, appears to be free from danger with the exception of a rock awash a short distance outside the edge of the reef fringing Pangallap, and which bears E. by N. ½ N. from the north end of Dedap.

A small islet lies close to the north-west point of Dedap, and half a mile off in that direction lie two small islets, encircled at a short distance by a reef; these islets form the southern limit of Abang strait (*see* page 384).

These three islands, Allor, Pangallap, and Dedap, with their adjacent islets and rocks, may be considered to form one group.

RODONG GROUP lies to the westward of Niamok and Missana, (*see* page 343) and comprises six islands, separated by narrow unavailable channels. Rodong, the northern island, is 797 feet high, and is one of the principal land-marks for making Rhio strait. The three eastern islands are known as the Desie islands; the two western as the Madang islands.

The channel between Missana and the Rodong group is encumbered with numerous dangers, and should not be used.

DUA ISLANDS, situated W.N.W., 2½ miles from Madang islands, are two low islands, each encircled by a reef extending in some places a quarter of a mile from the shore and divided by a narrow channel having a depth of 4 fathoms. Two reefs, each about half a mile in extent, and separated by a narrow deep-water channel, lie 1½ miles north-westward of Dua islands. On the south end of the southern reef is an islet, and at the north end are some rocks above water; on the north-east extreme of the northern reef is Tree rock, 14 feet above high water with a tree upon it.

A coral patch, with 3 fathoms water, and 11 to 14 fathoms close around it, lies N.W. by W. ½ W. nearly a mile from Tree rock, the channel between them is safe.

TETAMPAN GROUP, situated north-westward of the Rodong group, occupies a circular space about 4 miles in diameter, and is comprised of several islands, islets, and rocks, separated from each other by narrow intricate channels which are obstructed by numerous reefs and dangers. Tetampan, 390 feet high, situated near the south-west part is the highest and most conspicuous of the group; Binan and Katang Linga forms its eastern and northern limits, and the Nopong islands, with the adjacent islets and reefs, its north-western.

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TEMIANG STRAIT, leading from the China sea to Durian and other straits adjacent, is about 14 miles long N.W. by W. ¼ W. and S.E by E. ¼ E., and 2 miles broad; it is bounded to the southward by the northern islands of the Sebangka group, by Temiang, Pintoe and Kebat, and to the northward by Niamok, the Rodong group, Dua islands, and Tree rock reefs.

A dangerous pinnacle rock-awash, and difficult to make out, lies at the southern entrance of this strait, nearly one mile N.E. from a group of small islands south-eastward of Temiang. This danger may be passed on either side, the channel to the southward being three-quarters of a mile wide, but it is preferable to pass to the northward; in doing so, however, care is necessary to avoid the shore reef which projects half a mile to the southward of the east point of Desie, and also a rock awash which lies more than 2 cables from the south point of the Madang islands.

RODONG STRAIT, between the Rodong and Tetampan groups, is also navigable, but there is a rock-awash N.N.E. ¼ E. more than 6 cables off the north point of Rodong; there are also two patches of reef, one lying a quarter of a mile south-eastward, and the other about double the distance south-westward, of the southern island of the Tetampan group. Besides avoiding the first-mentioned danger, vessels when working should not stand to the southward of a line joining the northern extremes of Rodong and Missana islands.

The channel between the Tetampan group, and Dua islands is safe, taking care not to stand nearer than three quarters of a mile towards the south-west islands of the group between Tetampan and Little Nopong.

PANGALLAP STRAIT is limited on the east by the Tetampan group and the Selinga islands, and on the west by Allor, Pangallap, and Oedik, (*see* page 345). A bank with 5 to 10 fathoms water on it lies in the fairway of this strait, having on the northern end a rock-awash from which north Selanga island bears E. ½ S. 1¾ miles, and the apex of Allor island S.W. by S. 2¾ miles; and near its southern extreme a 2¼ fathom patch of hard sand, with the north-east extreme of Pangallap bearing N.W. ½ N. 2½ miles, and the apex of Allor Island S.W. ¾ S. 1½ miles. Vessels may pass between or on either side of these dangers, but it is better to pass to the eastward of both. South of the north-east point of Pangallap, a hard mud bank, with 5 to 10 fathoms water over it, extends nearly a mile to the eastward, and the same distance to the southward, and a bank of sand nearly half as large, with about the same depth of water over it, extends to the eastward of Oedik; elsewhere the soundings are very irregular, 13 to 28 fathoms.

The strong tides near the springs, owing to the uneven nature of the bottom, cause violent whirls and overfalls which are alarming to strangers; but it seems only necessary to avoid the above described dangers

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to pass safely through the strait, as none besides those could be discovered though carefully searched for.*

ABANG STRAIT. — Little Abang island, about a mile in extent, lies 2 miles N.W. by N. from Dedap, with the Nio islands, surrounded by reefs, lying nearly a mile from its eastern side. Between Dedap and Little Abang is Abang Strait, narrowed to the breadth of a mile by two islets which lie half a mile off the north-west end of Dedap, and by the Sapientoe islets and rocks, the outer edge of which is three-quarters of a mile from the south-east end of Little Abang. A short distance westward of the fairway of the strait is a deep having 25 fathoms, with 15 fathoms round its edge; the depths near the islets are 7 fathoms with 12 in mid-channel, increasing to 20 or 30 fathoms between the north point of Pangallap and the Nio islets.

GREAT ABANG ISLAND, 4 miles long north and south and 2½ miles broad, is situated north-west of Little Abang, and is separated from it by a channel with 3 to 9 fathoms, which is contracted near the centre to one cable in breadth by an island near Great Abang, and the reefs extending from both islands.

A rock, with 3 feet water over it, and 4 to 9 fathoms close to, lies W. ¾ S. nearly a mile from the south-west point of Little Abang, and S.E. ½ E. the same distance from the south point of Great Abang. Close to the west side of Great Abang is Tortel islet, and W. ¾ S. 1¼ miles from this islet is Hippomenes rock, awash with 7 to 13 fathoms around it.

Cameleon Rock is small, about a foot above high water, with 11 fathoms close to its west side, and some patches of 2½ and 3 fathoms from a quarter to half a mile northward and north-eastward of it. From the rock the apex of Potong bears N.N.W. distant 6¾ miles, and the south point of Little Abang E. ¾ N. distant about 7 miles. Potong, if not brought to the westward of North, will lead well clear to the westward of Irene, and Cameleon rocks.

POTONG ISLAND, lying 5 miles W.N.W. from Great Abang, has several hills on it, one of which is 462 feet high. The island is surrounded by numerous islets and rocks, which, off its south-east side, extend three-quarters of a mile. Off the north-east side the soundings are irregular and somewhat shoal, 3¼ fathoms being found at two-thirds, and 2¼ fathoms at one-third of a mile from the shore.

DUMPO STRAIT, 7 miles long N.W. and S.E., and 3 miles broad, is bounded on the south by Oedik island and the eastern sides of the Abang group, and to the northward by Dumpo, the south-west part of Pulo Galang, and the islands Penjaboeng and Semoet, which lie off the

* Staff Commander J. W. Reed, H.M. Surveying vessel *Rifleman*, 1869.

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west coast of Galang. Shore reefs, not extending far from most of them, front the whole of these islands, but from the south-west part of Galang the reef projects a third, and from Semoet about a quarter of a mile.

This strait affords easy and safe navigation, the fairway being perfectly free from danger, and the following rocks lie so near the shore that they may be easily avoided. Haai reef, a patch of 2 fathoms, lies a quarter of a mile S.S.E. from Pulo Dumpo; a 6-feet rock E.S.E. half a mile from the south-west point of Galang; a rock above water E. by S., a third of a mile from the north point of Great Abang; and Penjaboeng rock, S.W. ¼ S, half a mile from the north point of the island of that name. This last is the most dangerous, and will be avoided if the south-west point of Galang be kept open of the south-west point of Penjaboeng, and the apex of Tafelberg, a table hill on Galang island, open of the north-west end of Semoet. The soundings in the strait are irregular, varying from 11 to 24 fathoms.

PASSAGE by ABANG and DUMPO STRAITS.—It should be mentioned here that, in order to avoid the difficulty and delay sometimes experienced in getting from the northern part of Durian strait to Singapore road, many sailing vessels have preferred to pass from the Inner route by Abang strait or Dumpo strait into Rhio strait. It seems probable that the best passages might be made in this way, for the great depth of water in the western part of Singapore strait is often embarrassing in light winds. H.M.S. *Saracen* made a good passage by the Abang strait route, first experiencing all the advantages of the smooth water and less unfavourable tides of the passage inside Linga by Varella strait, and then passing without the least difficulty through Abang strait into Rhio strait.

THREE BROTHERS.—The South Brother, in lat. 0° 33′ 30″ N., long. 103° 45¾′ E., is the largest and highest of the three islands lying at the south entrance of Durian strait. It is about a mile in length, North and South, and about one third of a mile in breadth; the highest hill near the centre of the island is 257 feet high, and may be seen 17 or 18 miles. There is a white cliff or rock on the north-east side, which makes this island remarkable.*

The Middle Brother, 135 feet high, lies about 1¼ miles northward from the north point of the South Brother.

Between the South and Middle Brother there is a safe passage, about two-thirds of a mile wide, with soundings from 9 to 13 fathoms. Both these islands may be approached to a prudent distance all around, except at the south point of the South Brother, where rocks project considerably.

* *See* Admiralty chart of Durian, Muro, and Jombol straits, No. 2,402, scale $m = 0{\cdot}65$ of an inch.

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The North Brother, sometimes called the Round Brother, is smaller and lower than the others, being but 87 feet high. It lies N. by W. ½ W. 2½ miles from the Middle Brother, and between them there is a safe passage, with 11 to 17 fathoms water, now frequently used; but vessels passing through should keep tolerably close to the Middle Brother, to avoid a rock appearing above water, at the extremity of a reef of straggling rocks that project nearly a mile S.S.E. from the North Brother, and which is partly dry at low water; but there is deep water between the rocks in some parts.

EASTERN BANK, which bounds the channel to the eastward of the Brothers, is composed of hard sand, having irregular depths on it from 6 feet to 6 fathoms, with 10 and 12 fathoms close to its western edge. From the North Brother, its south extreme bears East southerly, about 5 miles, thence its western edge extends N. by W. ½ W. 3¾ miles, rounding afterwards to the north and north-east.

LOW MANGROVE ISLANDS.—Several low mangrove islands extend from about 2½ miles northward of the Sumatra coast, to a distance of 8 or 9 miles in that direction from it. South island, the south-easternmost of the group, is small 90 feet high and surrounded by rocks. The north-easternmost one, named Long island, which lies about 6 miles westward of the South and Middle Brothers, is 1½ miles long, north and south; and 1¼ miles north westward of it is a higher island, named Saddle.

SHOAL PATCHES.—A patch having only 2 fathoms water over it lies with the northern extreme of Long island bearing W. ½ S., Saddle island W. ¾ N., and the peak of False Durian N.N.W. ¼ W. Three-quarters of a mile to the southward of this patch are 3½ fathoms, and 4 or 5 fathoms at a short distance from its eastern side.

About a mile north-eastward of the 2-fathoms patch is another with 3 fathoms water over it, and 4 and 5 fathoms around it, discovered in 1861 by Mr. Stanton, commanding H.M.S. *Saracen*. It is about a third of a mile in extent, composed of sand and shells and lies three-quarters of a mile South from Rocky islet off the eastern extreme of False Durian. Near the centre of the patch the high peak of Great Durian is just open eastward of Rocky islet, and False Durian peak bears N.W. ½ W. Vessels from the southward after passing the South Brother should give the south side of False Durian a berth of 4 miles, as other shoals extend nearly this distance on the above bearing.

All these dangers will be avoided by keeping South Passage island, or the west end of Little Durian, open eastward of the Rocky islet lying off the eastern extreme of False Durian; or by not bringing the latter

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to the northward of N.N.W. until nearly abreast of it, when it may be approached to 2 cables.

At 3½ miles South of Rocky islet is a patch of 4½ fathoms, with 6 to 8 fathoms around it; and a mile to the southward is another of 5 fathoms, with 6 fathoms around it. Half a mile S.S.W. of this last is the 5-fathoms edge of the bank extending from the Sumatra coast.

The edge of the Sumatra bank and the whole of these patches may be avoided by not bringing the peak of Great Durian to the northward of N. ¾ W., and it would seem advisable for large vessels not to stand far to the westward of that line, for from the patchy character of the ground it may be probable that other shoaler spots may exist.

FALSE DURIAN or Pulo Duri, is an irregular shaped island about 2½ miles in extent, and with the adjacent islands, forms the south-western limit of Durian strait. Near its north-west end is a peak 604 feet high, which bears West distant 5 miles from the North Brother.

Three or four small islands lie close to the south-east point of False Durian, the outermost and smallest of which is named Rocky islet. A group of islets and rocks, called Rocky islands, lie off the north-west point.

Horsburgh observes that,—"As the islands hereabout have a similar appearance, strangers when coming from the southward ought to be careful not to mistake one for the other, for some vessels have not been able to discern the proper passage. The conical peak of Great Durian being higher than any of the other land, is first discerned in coming from the southward."

RICHARDSON SHOAL, on which the ship *Henry Puddemsey* Captain Richardson, struck in May 1863, is about 200 yards in extent, with 2¾ fathoms water, and 7 to 10 fathoms around and between it and the east side of False Durian island. From the rock the peak of False Durian bears W. ¾ N., distant 2¼ miles; Rocky islet S. by E. three-quarters of a mile; North Brother E. ¾ N. 2¾ miles; and Middle Brother S.E. by E. 4 miles.

To avoid this rock, do not bring Rocky islet south of S. by W., until the peak of False Durian bears West.

A BANK having 4½ and 5 fathoms water over it, about a mile long N.W. and S.E., lies a mile north-westward of False Durian.

GREAT DURIAN or Pulo Sanglar, about 4 miles N.N.W. of the North Brother, is 3¾ miles in extent, with a peak near its centre 965 feet high.

The TOMBS is the name given to some islets and reefs, extending about three-quarters of a mile from the southern part of Great Durian.

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A small reef of coral lies about half a mile south-westward of the Tombs, and about a mile S.E. by S. from the south-west point of Great Durian. Between this reef and the Tombs are 12 fathoms water, and from 15 to 27 fathoms at a short distance from both dangers. Great Durian peak bearing North, and False Durian peak bearing S.W. ½ W., will lead about half a mile clear of the western and southern sides of both dangers.

LITTLE DURIAN, 590 feet high and 2 miles in extent, lies off the north-west extreme of Great Durian, from which it is separated by a channel a quarter of a mile wide. There are some rocks close to the south-west shore of Little Durian, and a small islet with a rock outside it off the north-west point.

SOUTH PASSAGE ISLAND, situated three-quarters of a mile from the south-west coast of Little Durian, is 204 feet high, about half a mile in extent, north and south, and surrounded by rocks lying close to the shore.

NORTH PASSAGE ISLAND, 156 feet high, is about half the size of South Passage island, from which it bears N.N.W. ¾ W. 2⅓ miles.

PRINCESS ISLAND, lying W. by S. ¾ S. 2¾ miles from North passage island, on the western side of Durian strait, is low, of coral formation, covered with trees about 100 feet high, having a round and conspicuous appearance. On the eastern side there is a coral ledge, nearly awash at low water, extending 3 cables beyond the trees, and E.S.E. from the southern extreme of the island.*

SOUTHERN ENTRANCES of DURIAN STRAIT.—Durian strait may be entered on either side of the Three Brothers. When the peak of Great Durian is seen bearing N. by W., a vessel will be in the fair track for entering the strait by either channel, and should steer for the South Brother, which in one with Great Durian peak bears N.N.W. nearly.

The channel eastward of the Three Brothers, between them and the Eastern bank, and between the North Brother and the south shore of Great Durian, is about 4 miles wide, having various depths, from 15 to 10 fathoms.

The channel westward of the Brothers, between them and False Durian, is 3 miles wide, and has from 8 to 14 fathoms water, but near the North Brother 24 fathoms. Both channels are equally safe.

The Strait of Sanglar may also be considered one of the southern entrances to Durian strait, although it is but partially surveyed,

* Mr. W. Stanton, Master R.N.

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and does not offer any advantages to induce a vessel to proceed through it, but on the contrary is very inferior to either of the other channels. It lies to the northward of Great and little Durian, and is bounded on the north by the islands of Jang, Muro, and the group of Monkey islands. The strait is about a mile wide, and divided by two islands, which reduces the width of the navigable channel to the northward of those islands to little more than half a mile.

The depths between the Eastern bank and Great Durian vary from 14 to 9 fathoms. Large vessels should not, however, go nearer to the east coast of Great Durian than 2 miles, on account of a bank which projects more than 1½ miles from that side of the island, with 3 and 4 fathoms water, and possibly less in places.

In the eastern part of the strait of Sanglar the soundings are 18 to 12 fathoms, decreasing to 10, 8, and 7 fathoms at its western end. In the fairway of the western end is a patch of 4 fathoms, from which the north-west extreme of Little Durian bears S. by W. distant nearly a mile. The soundings in this strait are very few, and as it is quite possible that shoaler parts than those known of may exist, vessels ought not, therefore, to venture through.

MONKEY ISLANDS, three in number, lie from 1¼ to 1½ miles northward of Little Durian. The middle island, which is the largest, is about half a mile in diameter.

Rocks.—Two rocks or patches of reef lie off the north-west point of the westernmost Monkey island. The west extreme of Little Durian, if not brought south of S.S.E., will lead westward of them, and North Passage island kept south of S.W. by S., will lead to the northward. In the channel between these rocks and North Passage island the soundings are 27 and 28 fathoms close to the island and in the fairway, but near the rocks are 18 and 15 fathoms.

MURO ISLAND which forms the eastern side of the middle part of Durian strait, lies about 1¾ miles northward of Great Durian, it is 5½ miles long in a N.W. by N. and S.E. by S. direction, about 1½ miles broad at its south-east, and half a mile at its north-west end. On the east side of Muro island, between it and Suji island, is Muro strait.

The west side of Muro is but imperfectly known, and few soundings have been obtained near it. A reef appears to extend about a quarter of a mile from its north-west point, having 17, 14, and 10 fathoms close to.

DOLPHIN ISLAND, 153 feet high, situated about a third of a mile off the north-west end of Muro island, is about a mile in extent, and fronted on its western side by a coral reef projecting about a cable from the shore, near this reef the water deepens irregularly from 13 to 20 fathoms.

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A rock lies a third of a mile N.N.W. from the north extreme of Dolphin island.

A REEF, of an oval form, 2 cables in extent, steep-to all around, and dry at low water springs, lies a mile westward of the southern part of Dolphin island. From the centre of this reef the south end of Red island bears N. by W. $\frac{3}{4}$ W.; the centre of North Passage island S. $\frac{1}{4}$ W.; Sabon hill W. by N. $\frac{1}{4}$ N.; and the south-west point of Dolphin island is in line with a sandy point of Muro island.

PULO BOLOMBO, the southern end of which lies about a mile E. $\frac{1}{2}$ N. from the north end of Muro, and its north end about three quarters of a mile from the Twins, is high, about 3 miles long, N.W. by N. and S.E. by S., and half a mile broad. The north end of Pulo Bolombo is fronted by a reef to a distance of nearly half a mile, having a white rock within its margin, off the north-west point of the island.

RED ISLAND, or Pulo Goomeata, lying nearly 2 miles north-west of Dolphin island, is of a triangular shape, about half a mile in extent, and covered with trees. It is 256 feet high, and may be seen 15 miles.

ROCK AWASH.—The passage between Red island and Dolphin island ought not to be attempted, for nearly in mid-channel lies a dangerous rock, awash at low water spring tides, and the soundings near it being irregular, afford no guide. From the centre of this rock, the north-east end of Red island is in line with the south peak of Great Carimon, and the centre of the Twins bears N. $\frac{3}{4}$ E.

A ROCKY PATCH, dry at low water, lies rather more than half a mile W. by S. from the south-west end of Red island, with deep water all round, and between it and the island. From the centre of the patch, the north-west brow of Red island is in line with the south end of the North Twin, and the east end of South Passage island is a little open to the eastward of the peak of False Durian.

ROCKY ISLET.—Nearly half a mile northward of Red island is a small rocky islet with a tree on it, this islet is surrounded by rocks dry at low water, between which and Red island the depths are 15 and 16 fathoms.

The TWINS, or Pulo Mentegas, are two small round islands, 152 feet high, lying a little more than a mile north-eastward of Red island. They bear N.N.W. and S.S.E. from each other.

DANGEROUS REEF.—At three-quarters of a mile north-westward of the north Twin is the north end of a dangerous and extensive coral reef, dry at low water spring tides, having from 10 to 17 fathoms all round. From the centre, North Passage island bears South the east end

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of Red island S. by W., and the north-west end of Dolphin island (a rocky point) is a little to the westward of the peak of Great Durian.

The WESTERN SHORE of DURIAN STRAIT, from False Durian to the Carimons, is formed of numerous low islands, covered with trees, the principal of which is Sabon. This land is generally known as the Sabon shore, for the islands forming it are separted from Sabon and from each other only by very narrow channels, and therefore appear as one continuous island.

Islands between False Durian and Sabon Island.— Pulo Panjang, a large low flat island, lies northward of Saddle, and westward of False Durian ; off its north coast is a small islet named Round island.

Pulo Terreatep, the next island named on the chart, is the largest and easternmost of a group of several islands, and bears N.W. by W. $\frac{3}{4}$ W. 5 miles from the north-west point of False Durian ; about a third of a mile from its east side is a patch with 4 fathoms water on it.

Two miles N.N.W. $\frac{1}{2}$ W. from Terreatep, is what appears to be rather a conspicuous island, for it is delineated upon the chart as having two hills upon it, whereas all the adjacent land, and also Princes island, about a mile to the north-eastward, appears low. This island is distant about $1\frac{1}{3}$ miles from the nearest point of Sabon, a round island lying between them.

The channel between the island just mentioned and Princes island, has not been sounded. No vessel should venture through it, for reefs are known to extend a long distance from Princes island, and other dangers may possibly exist..

There are no known dangers off the eastern shores of these islands, and there appears to be rather irregular soundings of 9, 8, and 7 fathoms close to them. The $4\frac{1}{2}$-fathoms bank north-westward of False Durian has been referred to at page 387.

SABON ISLAND, or Pulo Pappan, is the largest island on the western shore of Durian strait. Its north point reaches to within 3 miles of the southern part of the Great Carimon, and off its north-east coast lie the islands of Búrú, Paril, and Pandan.

Deep-water point, the most eastern point of Sabon, lies $2\frac{3}{4}$ miles N.W. from Princes island. There is another point $2\frac{1}{2}$ miles westward of Princes island, the coast between forming a bay, fronting which is a reef with some trees upon it; from the outer part of this reef Deep Water point bears N.N.W. $\frac{1}{2}$ W. distant three-quarters of a mile. To avoid this danger keep the peak of false Durian open eastward of Princes island.

From Deep Water point the Sabon coast trends N.W. by W., and lying close off it are four islands, the north-westernmost of which is the largest.

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MIDDLEBURGH SHOAL, lying nearly mid-may between Red island and the bank extending from Sabon island, is a reef of coral rocks, 300 yards in extent, of circular form, partly dry, about one foot above the sea at low water spring tides,* its sides being almost perpendicular, with 7 and 9 fathoms close to the rocks, and 17 to 20 fathoms about 200 yards off. From the centre of the shoal, the Passage islands are in line, their east extremes bearing S.E. by S.; the rocky islet, with a tree on it, off the north end of Red island, nearly in line with the north brow of the North Twin; the Twins open to the northward of Red island; the south end of Red island, bearing E. by N. ¼ N.; Sabon hill, W. by N ⅓ N.; Clay island, W. ⅛ N.; peak of Great Durian, S.E. ¼ E., and the peak of False Durian, S.S.E. ½ E.

Passage eastward of Middleburgh Shoal.—The passage between Middleburgh shoal and the rocky patch off the west end of Red island, is 2 miles broad, with irregular soundings from 16 to 22 fathoms. With a fair wind the best leading mark is to keep the east end of North Passage island in line with the peak of False Durian, and stand no nearer Middleburgh shoal than to bring the east end of North Passage island in line with the west end of South Passage island, nor nearer to Red island than one mile, when the west end of South Passage island will be in line with the peak of False Durian, and the depth will be 25 or 27 fathoms.

Passage westward of Middleburgh Shoal.—The Passage between Middleburgh shoal and the bank extending from the Sabon shore is about 1⅔ miles wide, with soundings deepening from 6 or 7 fathoms near the bank to 14, 16 and 20 fathoms near the shoal. Deep Water point kept between the bearings of S. ¾ W. and S. ¾ E., will clear the Middleburgh shoal on one side of the passage, and the bank on the other.

PULO BURÚ is a low island 4½ miles in length N.N.W. and S.S.E., crowned with high trees, and having a few inhabitants, who collect great quantities of mangosteins, durians, and other fruits, which flourish here in a wild and luxuriant state. It is the next largest island to Sabon, and its south-east part bears N.N.W. nearly 5 miles from Deep Water point. Off its south end is a small island (Clay island) covered with straggling trees and surrounded by rocks.

The eastern shore of Pulo Búrú is fronted by a shoal-water bank to a distance of one to 1½ miles, and rocks partly dry at half tide nearly to the same distance, with Sabon hill, or Gunong Pappan bearing from W. ½ N. to West. These dangers may be avoided by keeping Deep Water point south of S. ¾ E.

Horsburgh remarks that Sabon hill cannot be easily mistaken, being the only hill on the western side of the channel to the southward of Great

* Horsburgh.

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Carimon, which island has two high peaks or hills, and the Little Carimon one (*see* page 32).*

PULO PANDAN and PULO PARIL.—Pulo Pandan, the southern of two small islands lying about a mile northward of Pulo Búrú, is low, and covered with trees about 100 feet high. Pulo Búrú is a much larger island than Pandan, lying to the westward of it, and close to the northern part of Sabon.

BANK.—Close to the eastward of Deep Water point the depth is 9 fathoms, and 5 fathoms close to the northern extreme of the point; thence a shallow bank extends, with a slight curve into the bight between Deep-water point and Pulo Búrú, as far as Pulo Pandan. Abreast of Pulo Búrú the bank presents a very irregular outline, with, as before stated, patches of rock upon it projecting in some places from one to 1½ miles from that island.

Deep Water point bearing S. ¾ E., will lead a mile clear of the edge of this bank in 4½ or 5 fathoms, abreast of the bight between Deep Water point and Pulo Búrú, and will also lead nearly half a mile outside the elbow or easternmost part of the bank off Pulo Búrú.

SAND BANKS.—A patch of 5 fathoms lies E. ½ S. 1¾ miles from Pulo Pandan; and there are two other patches of 4 fathoms off the same island, one bearing E. by N. nearly 2 miles, and the other about N.E. ½ N. the same distance from it. These patches seem to be the tail of a bank of sand lying about 2 miles off the south-east coast of Great Carimon, and which nearly joins another bank extending south-east from the Little Carimon. These banks are thus described by Horsburgh:—

"The bank of sand off the east end of Great Carimon extends N.W. by N. about 4 miles, with 4 fathoms on it in most places, and 2¾ on the western part; between which and the shore there are 5½ to 8 fathoms. About 2 miles S.E. from the south-east point of Little Carimon there are 3¾ fathoms on another bank, which stretches in a south-easterly direction, nearly joining to the former bank; and the general depths on it are from 4 to 5 fathoms."

Pulo Pandan bearing south will lead to the eastward of the 2¾ fathoms patch on the southern bank; and the peaks of Little Carimon in line about N.W. will lead close to the edge of the northern bank in 5 or 4¾ fathoms.

TIDES.—Throughout Varella and Durian straits the tides are very irregular, rendering it difficult to ascertain either their direction or velocity. In August and September the rise and fall was found generally to be between 10 and 11 feet, sometimes running from 3 to 4 knots per hour

* The Little Carimon has two high peaks on it, but they probably appear as one from the southward, being nearly of the same height.

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during the springs, at other times not more than 2½ knots at the same period. This irregularity appears to be produced by the prevailing winds in the north or south entrance of the straits, forcing the tides through in one direction for 12 or 18 hours at a time, although the rise and fall on the shore was regular. But sometimes the tides run with regularity.

It is high water at Red island, in the northern part of Durian strait full and change, at 10h.,* and the tide rises 10 or 11 feet.

Ripplings.—The ripplings might be alarming to a stranger; they appear to be caused by the uneven bottom, and the resistance the tides meet with from the steep reefs and numerous small islands.

SUGI, JOMBOL, BOELANG, and BATTAM, are four islands lying to the north-eastward of Muro and Bolombo islands (page 390). The two former are about 10 miles long in a N.W. and S.E. direction; the two latter are much larger, Boelang being about 15 miles long, in the same direction, and 7 miles broad, and Battam 15 or 16 miles in an east and west direction, and 13 or 14 miles north and south. The northern parts of Boelang and Battam form part of the southern side of Singapore strait.

Numerous small islands, islets, and rocks lie off the shores of and in the channels between the above-named large islands, the whole of which are known under the general name of the Boelang archipelago, but in the present state of our knowledge no vessel should venture among them, and it is therefore, only the outermost islands and dangers which concern the ordinary navigator, and those will be next described, after the following brief observations on the channels between the large islands.

MURO, SUGI, JOMBOL and BATU HADJI STRAITS are the names of the channels separating the large islands just described. Muro strait is bounded on the west by Great Durian, Muro and Bolombo islands, and on the east by the Eastern bank and Suji island. There are many islands and rocks in this strait, which has been but imperfectly surveyed. It is however navigable with proper care, and in 1860 an electric telegraph cable between Singapore and Batavia was laid through it from a large steam vessel piloted by a Dutch steam frigate.

Suji strait, between Suji and Jombol, is very imperfectly known, but it is certainly encumbered at both ends with many dangers.

Jombol strait, between Jombol and Boelang, is also encumbered with many dangers, although apparently not to so great an extent as Suji; it is but imperfectly known, and at present, like the rest of the straits, is not available for general navigation.

Batu Hadji strait, between Boelang and Battam, is very narrow, in some places not a quarter of a mile broad. A running survey was made

* Horsburgh.

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of this strait several years ago by Mr. L. C. Bailey, Master R.N., and it is said to be available for vessels, but we cannot give any directions for it. A short time since it was urged upon the attention of nautical men at Singapore as being a route by which vessels could be speedily towed from Singapore roads to sea in the north-east monsoon; but it will have to be properly surveyed before it can be used for such a purpose.

PULO DONCAN, lying N.E. ¾ N., distant 6½ miles from the Twins (page 390), is the larger of two low wooded islands, fronting the north entrance of the strait of Jombol, which is formed by a group of beautiful islands, some of which are inhabited. Pulo Doncan is surrounded by reefs, and ought not to be approached nearer than a mile.

Directions from Banka Strait through Varella and Durian Straits to Singapore.*—From Banka strait, abreast of Batakarang point in 7 fathoms, a N.N.W. course will lead towards Varella or Brahalla island, distant about 78 miles. The bank along the Sumatra coast in this case being very flat, the soundings are usually the best guide, and the rule is to keep in from 5½ to 7 fathoms. In working, the coast may be approached with care to a depth of 5 fathoms. Recollect, however, that at 9 miles S.E. by E. from Tanjong Bon the bank projects, forming a spit or horn, having only 4 fathoms water over it, and 6 fathoms between its northern part and the shore.

The tides near the shore are generally strong; in the offing they are irregular, and currents sometimes prevail.

In passing through the south channel, between Varella island and Tanjong Bon keep in 10 or 12 fathoms towards Varella to give a berth to the bank of hard ground projecting from Tanjong Bon; thence in working along the coast to the westward, the bank is steep-to, and may be approached occasionally, with care to 8 or 7 fathoms.

Standing towards Varella, remember the shoal with only 2 fathoms water over it, reported to lie E.S.E., 3 miles from that island (page 374). Being through the narrow part of the passage between Tanjong Bon and Varella, which is about 6½ miles wide, a N.W. by W. course should be steered towards the Alang Tiga islands, keeping also the coast in soundings 9 to 12 fathoms. With a working wind, the Sumatra coast may be approached to 6 or 7 fathoms. When steering towards the Alang Tiga, the southernmost island must not be brought more westerly than N.W. by N. until Seera or Reef island is south of E. by S. ½ S., to avoid the Speke rock (page 376).

In this track attention to the tides is indispensable, for they are often irregular, sometimes setting out of the Jambie river to the north-eastward

* Mostly from Horsburgh.

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2½ or 3 miles per hour; and the coast bank to the distance of 14 or 15 miles westward of Tanjong Bon, is nearly dry at low spring tides, in some places 4 or 5 miles from the shore.

Between the Alang Tiga islands and Basso islands the soundings vary from 7 or 8 fathoms near the Alang Tiga, to 13 and 14 near the edge of the bank which projects from Basso; deepening to 15, 16, and even 18 fathoms 2 miles eastward of Dato point.

Having passed the Alang Tiga at about 2 miles, a course about N. by W. should be steered for the southernmost of the Three Brothers, bearing from the Allang Tiga N. by W. ½ W. distant 63 miles. In working, be careful not to stand nearer to Basso island or Dato point than 2 miles, and also avoid being tempted to stretch into Amphitrite bay, for the banks off the former, and the shoals in the latter, are steep-to, and the lead cannot be depended upon to give warning in sufficient time, at all events not near Basso island or Dato point; with great care it may do so, apparently in Amphitrite bay. At 6 or 7 miles northward of Dato point the soundings decrease more regularly towards the bank, which may from thence be approached by the lead into 9 and 8, and into 7 fathoms towards the low Mangrove islands. In standing to the eastward do not deepen above 18 or 19 fathoms, particularly as the distance from the Alang Tiga islands is increased, for the ground on that side is foul, and unsuitable for anchorage.

Marks for keeping clear of the Irene rocks and other dangers on the eastern side of the channel have been given in page 381, and the navigator is referred to them if he should stand so far over to the eastward, which is, however, out of the fair track.

To enter Durian Strait by the Eastern Channel, a berth of one or 2 miles may be given to the South and Middle Brothers, by passing them in 10 or 12 fathoms, and on nearing the North Brother, give a prudent berth to the reef that projects from it to the south-eastward, taking care also not to stand too far over towards the Eastern bank. This bank will not be approached too close, if the beach of the Middle Brother be kept well in sight from the deck; or in working, if the vessel gets on the edge of the overfalls in making the eastern board, tack immediately, and stand towards the Brothers to 10 or 11 fathoms. When the southern point of Great Durian is approached, the Tombs will be discerned; and Sabon hill bearing about W. by N. ¾ N., making like two islands, which may be mistaken for the Carimons. Having passed the North Brother, at 1½ or 2 miles' distance, steer to the westward, giving a berth of about 1½ miles to the southern part of Durian, to avoid the sunken rocks rather more than half a mile south-westward of the Tombs.

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To enter Durian Strait by the Western Channel, when near the South Brother, steer to the westward of it at 1½ miles' distance, and proceed to the northward in 8 to 12 or 14 fathoms, about mid-channel between the other Brothers and the eastern part of False Durian, to avoid the foul ground surrounding the Brothers, and the shoal patches which lie to the southward of Rocky islet near to the east end of False Durian (*see* page 387).

Take care, however, when standing towards False Durian, not to bring Rocky islet to the southward of S. by W. until the peak of False Durian bears West, to avoid Richardson rock.

Having cleared the Brothers by either of the channels, the Passage islands will be seen to the north-westward on the east side of the channel; and on the west side, opposite North Passage island, is a flat island named Princes. There is a channel between the Passage islands and Little Durian, but it is not frequented, as it is not so convenient as the former; but in case of necessity a vessel may pass between any of these islands, giving them a birth of one mile, as off their points there is generally rocky and foul ground.

After passing the Brothers, steer for the Passage islands; in mid-channel the depths will be generally from 17 to 26 fathoms. On approaching Passage islands, Red island about 6 miles N. ½ W. from North Passage islands will be discerned; and may be known by two islets north-eastward of it, named the Twins. With care, the passage between Middleburgh shoal and Red island is safe in daylight; but as a reef, dry at low water, lies W. by S. more than half a mile from the latter, and the depths being from 17 to 26 fathoms, with some overfalls, the channel to the westward is preferable.

There is a narrow passage, with 15 fathoms water, between Red island and the reef just mentioned, through which the country ship *Warren Hastings* passed in 1789, but it ought not to be followed.

There is also a passage close to the eastward of Red island; but as its eastern side is bounded by the rocks lying about a mile north-west of the Twins, and by others about three quarters of a mile E.S.E. of Red island, it ought not to be attempted by a stranger.

The Channel Eastward of Middleburgh Shoal, between it and the reef lying W. by S. from Red island requires care; the best track is about mid-channel in 19 to 16 fathoms, mud. When Middleburgh shoal is conspicuous, a vessel may borrow towards it with a commanding breeze; otherwise, it will be prudent to keep mid-channel between it and Red island. The peak of Great Durian bearing S.E. a little southerly,* or

* Horsburgh says S.E. ½ S., but that appears to lead very close to the reef off Red island.

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east point of North Passage island in line with the peak of False Durian, bearing S.S.E., will lead mid-channel between the patch off Red island and Middleburgh shoal. In working, do not bring the peak of False Durian above a ship's length open westward of North Passage island, nor stand nearer to the reef off Red island, thad to bring that peak nearly in line with South Passage island. The tides are very strong between Middleburgh shoal and Red island, the flood setting to the southward, and the ebb to the northward, from 3 to 4 knots on the springs.

The Channel Westward of Middleburgh Shoal is preferable, being about 2¼ miles wide with mostly regular soundings from 16 and 17 fathoms close to the shoal, decreasing gradually towards the Sabon shore over a bottom of soft mud, proper for anchorage. When clear of North Passage island, haul to the westward for the Sabon shore, then steer about N.N.W. along it, in 7 fathoms, which will lead in the fair track between that shore and Middleburgh shoal. When Red island bears East, or E. by S., edge out a little, about N. by W. or North, and deepen to 10 or 12 fathoms; continuing to keep in these depths, steer to the northward, taking care to give a good berth to the south end of Great Carimon, to avoid the bank of 2¾, 3, and 3½ fathoms, sand and mud, which projects 3 miles from the south point of that island. When abreast of this point the distance of 4 or 5 miles should be preserved from the east side of Great Carimon, and the Little Carimon may be rounded at any convenient distance, if bound to the northward.

In working, do not deepen towards Middleburgh shoal to above 8½ fathoms, as there are 9 fathoms very near its western edge; but the Sabon shore may be approached to 5½ or to 5, or even 4½ fathoms, in a small vessel.

To pass through Phillips Channel.—If bound to Singapore having passed between Middleburgh shoal and the Sabon shore, and brought Red island to bear East or E. by S., a course about N.E. by N. may be steered, guarding against tide, to pass through Phillips channel to the westward of Doncan island and between Cap island and Round island, neither of which should be approached nearer than three-quarters of a mile, on account of the reefs which project from them.

In this route take care that the vessel is not set too near the dangers which lie at the entrances and near the points of Muro, Suji, and Jombol straits, for the tide runs through them with a velocity of 3 or 4 knots at springs. After shaping a course to pass between Cap and Round islands, the dangers off Red island and the Twins will be avoided, by not bringing Pulo Doncan to the northward of N.E. by E.; and Cap island kept on a N.E. or N.E. by N. bearing will lead well to the westward of the dangers extending from Pulo Doncan.

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Having passed Cap island, bring it to bear S. by W. ¾ W., or S.S.W. astern, which will lead through in mid-channel between Round and Long islands to the west, and Helen Mars reef to the east. The soundings in this track are very variable, 15 to 35 fathoms.

In working, if standing westward of the south end of Round island, do not go farther in that direction than to bring Raffles lighthouse on with the north-west end of Long island, to avoid the rocky reefs lying to the south-west of Red island (page 84); between the latter island and these reefs the soundings are irregular.

Standing towards the north-east sides of Round and Long islands, to avoid the reefs which extend from them, Cap island should not be brought south of S. by W. ½ W., or Raffles lighthouse east of N. by E. Cap island, if not brought west of S.S.W. ¾ W., or Steep Cape, the bold headland inside Cap island, kept to the south of S. ½ W., will keep the vessel clear of Helen Mars reef; and when the northern peak of Great Carimon is well open northward of Red island, a vessel will be northward of that danger, and may proceed to the north-eastward into the fairway of the main channel of Singapore strait. To proceed from thence to Singapore road *see* page 100.

If preferred, instead of using Phillips channel, a vessel after passing between Middleburgh shoal and the Sabon shore, may steer a North or N. by E. course, and passing to the westward of Tree island, proceed to Singapore road by the main channel, as directed at page 100.

Directions from Singapore Strait through Durian and Varella Straits to Banka Strait.*—Having proceeded as far as Raffles lighthouse, according to the directions given at page 101, and brought it to bear W.N.W., or N.W. by W., distant about 1¼ miles, Cap island will be seen bearing about S. by W. ¾ W. or S.S.W., and kept upon either of those bearings it will lead about mid-channel between Helen Mars reef and Round island. In working, Cap island must not be brought west of S.S.W. ¾ W., or Steep cape west of S. ¼ W. to avoid Helen Mars reef. The dangers extending from Round island and Long island will be avoided by not bringing Cap island south of S. by W. ½ W.

Having passed westward of Cap island, which must not be approached nearer than half a mile, a course about S.W. or S.W. by S. may be steered towards the Sabon shore, but as before noticed, care is necessary to guard against the effects of the tide in this locality.

Cap island kept on a N.E. or N.E. by N. bearing, will lead well to the westward of the dangers near Doncan island, and after that island is passed, it should not be brought north of N.E. by E. until a depth of 7 fathoms be

* Mostly from Horsburgh.

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obtained near the Sabon shore, to avoid getting too near the dangers lying off the Twins and Red island.

With a commanding breeze, the passage eastward of the Middleburgh shoal may be taken by keeping the east point of North Passage island in line with the north-west peak of False Durian, which will lead mid-way between the shoal and the rocky patch: the water deepens towards the Middleburgh shoal, it being steep to all around. To prevent being set upon it in light winds, caution is requisite, as the tides run here from 3 to 4 miles an hour at times, with strong ripplings, which are likely to prevent the vessel from steering.

A vessel being abreast of Little Carimon, with its northern end bearing West from 2 to 2½ miles, a S.S.E. ½ E. course will carry her clear of the mud-banks fronting the low land of Great Carimon, in soundings from 7 to 8 fathoms, until the north end of Pandan island is in line with the north end of Sabon, when the strait between Great Carimon and Sabon will be open. With a working wind from Little Carimon the soundings are the best guide in standing towards the mud-banks fronting Great Carimon, which ought not to be approached to a less depth than 6 fathoms, remembering that the peaks of Little Carimon in line bearing about N.W. lead close to the edges of the shoal banks; the depths in the offing are from 14 to 16 fathoms mud. The peaks of Little Carimon in line, will lead outside the dangers off Great Carimon, as will also Pandan bearing South.

When the strait between Great Carimon and Sabon is open, the soundings become irregular; and here caution is requisite with a working wind, as the tides set strong through this strait to the westward at times. When the north end of Pandan is on with the north end of Sabon, and the vessel is distant from the former 3 miles, in 7 fathoms, a S. by E. course will lead clear of the mud-bank that fronts Pulo Búrú, and mid-way between it and Middleburgh shoal, till the north end of Red island is in line with the south end of the South Twin, and the soundings will be irregular, from 5 to 9 fathoms.

In working, a vessel may stand to the eastward to a moderate distance at discretion, but she must not approach the shore of Pulo Búrú nearer than 1½ miles in 5 to 6 fathoms. When the south end of Pulo Búrú bears West, the soundings will decrease regularly on the edge of the mud-bank which extends southward as far as Deep-water point, and the mud-bank may be borrowed on at discretion. Standing eastward towards Middleburgh shoal, do not approach it nearer than to bring the west end of North Passage island to touch the east end of South Passage island; the north end of Red island in line with the bluff-headland to the eastward, will lead northward of the shoal, and the north end of Red island in line with the

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south end of the Twins, will lead southward ; the latter transit-line also just clears to the northward the rocky patch lying to the westward of Red island.

When clear of Middleburgh shoal, and of the shoal to the westward of Dolphin island, as the strait to the southward is free from danger, a direct course may be steered for the east end of False Durian; the Passage islands may be approached to any convenient distance. Princes island must not be neared much under a mile, as dangers extend a considerable distance from it. The soundings throughout are very irregular, decreasing towards the western shore where there is a good anchorage. At $1\frac{1}{4}$ miles from the north-western and largest of the two rocky islets off the north-west end of False Durian, and it being on with the peak of the latter, there is a bank of hard sand and stones three quarters of a mile in extent, having $4\frac{1}{2}$ fathoms least water, and from 10 to 6 fathoms close-to; when on it, the east side of South Passage island is in line with the north end of Little Durian.

Standing towards the south end of Great Durian, come no nearer the Tombs than one mile, when South Passage island will bear N.W. by W. $\frac{1}{4}$ W., to avoid the small reef of coral rock lying half a mile from the south Tomb, and near to which are 20 to 29 fathoms. The best anchorage in this part of the strait will be found about three-quarters of a mile from the eastern shore of False Durian, in 12 to 14 fathoms. With a working wind, keep near False Durian, where the tides are much stronger than in mid-channel ; but take great care to bring rocky islet to the west of S. by W. before the peak of False Durian bears West, to keep clear of Richardson shoal.

To pass Westward of the Brothers, between them and False Durian, steer through in mid-channel ; but with a working wind, either side of the channel may be borrowed on, when to the southward of Richardson shoal.

After passing rocky islet, off the south-east end of False Durian, keep it bearing west of N.N.W. until to the southward of the 3-fathoms bank, lying nearly a mile south of it.

To pass Eastward of the Brothers, after passing the Tombs steer E. by S., keeping about 2 miles from the north and east sides of the North Brother, where the water will shoal to 12 or 13 fathoms; then steer about S. by E., attending to the set of the tide, to pass the Middle and South Brother at the same distance, not borrowing nearer them than 10 or 12 fathoms. With a working wind, do not stand too far over towards the Eastern bank, but tack immediately, if irregular soundings are got on the overfalls near it, nor so far out as to sink the beach* of the Middle

* These marks are not applicable to vessels whose decks are very high from the water.

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Brother from the deck. The depths in this channel will be mostly from 10 or 12 fathoms near the Brothers, to 16 or 18 fathoms near the overfalls on the edge of the Eastern bank.

Being abreast of the South Brother, at about 2 miles distance, steer South or S. by W. until it bears N.N.W.; and whether the vessel has passed eastward or westward of the Brothers, after having brought the South Brother to bear N.N.W., steer about S. by E. ½ E. towards the Alang Tiga islands, and endeavour to keep in from 14 to 16 fathoms. With a working wind the best track is to stand to the eastward until in 17 fathoms, about mid-channel, and into 12 fathoms towards the Sumatra shore, but not under this depth in passing Dato and Basso points, as the shoal fronting the latter is steep-to, with 8 to 14 fathoms near its edge. After passing Basso point, the coast may be approached occasionally to 6 or 7 fathoms; but the best track with a fair wind is about mid-channel between it and the Alang Tiga, or pass about 2 or 2½ miles westward of these islands at discretion.

Having passed the Alang Tiga, keep the southernmost island to the north of N.W. by N. until Seera island bears East or E. ½ S., to avoid the Speke rock; the proper track from the Alang Tiga to Varella is to keep along the Sumatra coast in 9 to 12 fathoms, borrowing to 6 or 7 fathoms towards the coast, with a working wind.

Caution is however necessary if running here in thick weather or in the night, on account of strong tides setting into or out of the rivers, for the *Princess Charlotte*, at 1 A.M., April 11th, 1813, steering S.E. by E., shoaled suddenly from 14 to 8 and 5 fathoms, then grounded on a bottom of sand and mud on the extensive bank fronting the coast to the westward of Tanjong Bon, opposite the mouth of the Jambie river, At daylight Varella was said to bear E.N.E., Linga peak N.N.E. ½ E., Tanjong Bon S.E. by E. ½ E., the Sumatra shore distant about 6 or 7 miles, observed lat. 0° 55′ S. Having grounded at high water, the tide fell from 18 to 10 feet, and with every exertion, by rafting the spars alongside, starting water, and throwing 1,332 bags of rice overboard, to lighten the ship, she could not be floated off until the 15th, four days after she grounded on the bank.

Varella island may be passed at about 2 miles distance in 10 or 12 fathoms; but the spit surrounding Tanjong Bon is steep from 5 fathoms, and should be approached only with great caution under a depth of 10 fathoms in working.

From a position about 8 miles East from Tanjong Bon to abreast Batakarang point, at the entrance of Banka strait, the course is about S.S.E., and the distance 66 miles, and the whole of the bank fronting the coast is in this space very flat, with regular soundings upon it, except the horn or spit with only 4 fathoms on it, lying 9 miles south-eastward of Tanjong

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Bon. The best guide, therefore, after leaving Varella, is to keep along the coast in from 5½ to 7 fathoms, until Batakarang point is approached; and 6½ or 7 fathoms are the proper depths to preserve, when passing this point and entering Banka strait, to avoid the Frederick Hendrik rocks, on the east side the channel: with a working wind, the point may be approached to 5½ or 5 fathoms.

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TABLE OF POSITIONS.*

Place.	Particular Spot.	Latitude.	Longitude.	Authorities.
		North. ° ′ ″	East. ° ′ ″	
MALACCA STRAIT.				
Pulo Brasse	Lighthouse	5 45 0	95 4 15	Netherlands Government Survey, 1872–4.
Acheen river	East entrance point.	5 35 35	95 20 45	„
Diamond point	North extreme	5 16 0	97 30 0	„
Pulo Penang	Fort Cornwallis	5 24 30	100 20 9	Various.
Dinding islands	Port Pancore	4 13 19	100 34 8	Napier.
Parcellar hill	- - -	2 49 30	101 26 30	Ward.
Malacca	Flagstaff	2 11 30	102 15 36	„
SINGAPORE STRAIT.				
Coney island	Lighthouse	1 9 51	103 44 50	Reed.
SINGAPORE	Fullerton battery	1 17 20	103 51 18	„
Pedra Branca	Lighthouse	1 19 57	104 24 30	„
Bintang Great hill	Summit	1 4 20	104 27 24	„
SUNDA STRAIT.		South. ° ′ ″	East. ° ′ ″	
Flat cape	- - -	5 59 0	104 32 37	Netherlands Government Survey, 1874.
Krakatoa island	Peak	6 8 46	105 26 40	„
Java head	First point light-house.	6 44 30	105 11 30	„
Anjer	Flag-staff	6 3 10	105 54 50	„
St. Nicholas point	- - -	5 52 15	106 1 45	„
BETWEEN SUNDA AND BANKA STRAITS.				
North island	Centre	5 41 0	105 49 40	„
Peblakan island	-	5 28 30	106 23 0	„
North Watcher island	- - -	5 12 30	106 27 0	„
Brouwers shoal	- - -	5 17 30	107 0 20	„
Arnemuiden rock	- - -	5 12 30	106 42 0	„
South Brother island	S. point	5 10 25	106 6 0	Bullock.
Swallow rock	- - -	5 17 40	106 3 50	Wilds.
Lynn bank	- - -	5 12 0	106 12 0	Bullock.
Brouwers reefs	N. reef	5 4 45	106 15 0	„

* The positions by Captains Bullock and St. John, by Messrs. Richards, Stanton, and Wilds, as also by the Netherlands and United States Government Surveys, depend upon Batavia Observatory being considered in Longitude 106° 48′ 7″ East of Greenwich.

The positions by Lieutenant Ward, Indian Navy; by Captain Napier; Staff-Commander Reed; and those by Stanton marked thus †, depend on Fullerton battery, Singapore, being in 103° 51′ 18″ East.

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Place.	Particular Spot	Latitude.			Longitude.			Authorities.
		South.			East.			
		°	′	″	°	′	″	
BANKA STRAIT.								
Lucipara island	- - -	3	14	0	106	14	0	Stanton.
Lucipara point	- - - - -	3	13	30	106	5	0	„
Baginda point	- - - - -	3	5	20	106	45	0	„
Tobóe Ali fort†	- - - - -	3	0	48	106	27	25	„
Nangka islands†	- - West rock -	2	22	53	105	45	24	„
Kalian point†	- - Lighthouse -	2	4	37	105	8	23	„
Monopin hill	- - - - -	2	1	45	105	12	0	„
Batakarang point	- - - - -	2	1	0	104	50	0	„
Banka island	- - Tanjong Mellalu	1	31	30	105	38	15	Various.
„	- Highest peak of Gunong Marass.	1	51	0	105	53	0	„
„	- - Tanjong Crassok	1	29	0	105	57	30	„
GASPAR STRAIT.								
Hippogriffe shoal	. - - - -	3	33	36	106	53	0	United States Government Survey, 1854.
Hancock shoal	- - - - -	3	34	15	107	4	15	Wilds.
Larabe shoal	- - - - -	3	33	0	107	9	30	„
Sand island	- - - - -	3	29	0	107	9	0	„
Fairlie rock	- - - - -	3	27	15	106	59	30	„
Embleton rock	- - - - -	3	17	15	107	10	30	„
Entrance point	- . - - -	3	1	40	106	53	0	„
Brekat point	- - - - -	2	34	0	106	50	0	„
Gaspar island	- - Peak - -	2	24	30	107	3	15	„
Carnbee rocks	- - - - -	3	33	15	107	39	30	„
Kennedy island	- - - - -	3	19	20	107	41	0	„
Selio island	- - S. point - -	3	14	10	107	29	30	„
Six islands	- - - Ross island -	3	5	0	107	20	10	„
DANGERS NORTH AND N.W. OF GASPAR STRAIT.								
Canning rock	- - - - -	2	23	0	107	13	0	Various.
Belvedere shoals	- - S. W. end -	2	14	30	106	59	30	„
Dutch shoal	- - - - -	2	10	15	106	44	0	„
Magdalen reef	- - - - -	1	59	0	106	59	0	„
Actæon rock	- - - - -	1	39	0	106	37	0	Ward.
CARIMATA STRAIT.								
Shoe island	- - Summit - -	3	47	45	108	4	0	Napier.
Katapang island	- - - - -	3	23	20	107	55	30	Various.
Scharvogel islands	- E. island -	3	18	0	108	28	0	„
Discovery West bank	- - - - -	3	38	0	108	44	30	Napier.
Discovery reef	- - - - -	3	35	45	108	49	25	„

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Place.	Particular Spot.	Latitude.	Longitude.	Authorities.
CARIMATA STRAIT—*continued.*				
		South.	East.	
		° ′ ″	° ′ ″	
Discovery East bank	- - -	3 34 40	109 12 35	Napier.
Lavender bank	- - -	3 24 5	109 1 30	„
Cirencester bank	- - -	3 14 30	108 59 0	„
Osterly South shoal	Islet - -	3 19 30	108 37 14	St. John.
Cirencester shoal	- - -	2 54 30	108 56 0	Various.
East island	- - -	2 29 0	108 51 40	St. John.
Catherine reef	- - -	2 31 30	108 54 30	Various.
Ontario reef	Centre - -	2 1 45	108 39 0	„
Soruetou island	Summit -	1 42 0	108 42 0	„
Sambar point	- - -	3 3 20	110 15 0	„
Mount Minto	- - -	2 14 0	110 3 0	„
Fox shoal	W. rock -	3 32 0	110 7 45	„
Clemencia reef	- - -	3 24 0	110 7 45	„
Oliviera reef	- - -	3 10 0	109 47 30	„
Pulo Mankap	- - -	3 4 30	110 13 0	„
Pulo Kumpal	Sulphur point -	2 47 33	110 1 45	„
Birds Nest islands	Boorong island -	1 43 0	109 17 0	„
Ginting island	- - -	1 41 0	109 4 30	„
Pyramid island	Centre - -	1 29 30	108 59 0	„
Maleidong island	- - -	1 31 0	109 22 0	„
Panambungan island	W. point -	1 12 0	109 10 0	„
Masien Tiega islands	W. island -	0 55 0	109 12 30	„
BANKA STRAIT TO SINGAPORE.				
Docan island	- - -	0 58 0	105 38 30	Various.
Toty islands	- - -	0 54 0	105 46 0	„
Taya island	Centre - -	0 43 40	104 54 0	„
Ilchester bank	Centre - -	0 24 0	104 57 0	„
Jaboeng point	- - -	0 58 0	104 22 0	„
Basso point	- - -	0 20 0	103 45 15	„
		North.	East.	
Crocodile rock	- - -	0 1 0	104 52 0	„
Frederick reef	- - -	0 38 0	105 9 0	„
Geldria bank	N. extreme -	0 48 30	104 58 0	„
South Brother	- - -	0 33 20	103 45 45	„

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